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Eighth Year of The Eye-Bank for Sight Restoration, Inc.

More than 3,600 eyes have passed through the Eye-Bank laboratory and have been sent to surgeons throughout the country who are skilled in the corneal transplant operation.

THE recent announcement that a national advisory committee of distinguished ophthalmologists has been formed to serve The Eye-Bank for Sight Restoration focuses attention on this unique institution and its growth during the eight years that it has been established.

When through the efforts of R. Townley Paton, M.D., and Mrs. Aida de Acosta Breckenridge a center for the reception and distribution of human eyes that would provide material for corneal transplantation was set up in New York City in 1945 many ophthalmologists opposed the idea. As might be expected, there was a great deal of misleading publicity because of the dramatic aspects of the transplant operation. Many blind persons who could not be helped by this type of surgery were given false hopes when inaccurate statements appeared in the newspapers. But because the plan for such a bank was basically sound these early difficulties were surmounted. Today the institution functions quietly and efficiently with the cooperation of the medical profession in all parts of the country.

In the past eight years 3,624 eyes have passed through the laboratory and have been sent out locally and nationally to the large number of eye surgeons who are trained to perform the operation. As executive director Mrs. Breckenridge handles all the Eye-Bank's administrative problems and personally supervises the swift routine that has been established for sending and receiving donor eyes. In her office recently she paid special tribute to the American Red Cross and the national airlines for their cooperation in this connection:

"There are now 170 hospitals throughout the country, mainly those near a good airline service, that are affiliated with the Eye-Bank," she explained. "When a donor eye is needed anywhere in the country we send it immediately, if available, to the eye surgeon who requested it.

"The Red Cross carries the eyes to and from the hospitals locally, and nationally to and from the hospitals and airports. The airlines of this country, under the inspiration of Captain Eddie Rickenbacker, chairman of the board of Eastern Airlines, who were the pioneers in moving our eyes, have organized the shipments with great efficiency. Their splendid service and that of the Red Cross deserve the

gratitude and commendation of every American."

In each of the hospitals the pathologist is supplied with the bottles, containers, forms and instructions, and equipment is replaced promptly as needed. On request a complete pathological study will be made on any eye which is sent to the Eye-Bank and a report will be sent to the institution which supplied the eye; also bacteriological studies are made for possible contamination. If an institution desires to make its own pathological examination the eye is returned in the proper preservative fluid. One of the purposes of the Eye-Bank is to encourage complete pathological studies of all eye tissue sent to it.

Affiliated Eye Banks

A few cities, notably Boston and Chicago, have established eye banks that are affiliated with the New York institution. The Illinois Eye Bank, under the direction of the Illinois Society for the Prevention of Blindness, acts as a clearinghouse for eyes that are obtained locally in the Chicago area. These are used in Chicago if needed; otherwise they are sent to the Eye-Bank in New York. If an eye is needed in Chicago and there is none at hand, a shipment is made immediately from New York. The Boston bank functions successfully on a similar plan.

"This sort of teamwork," Mrs. Breckenridge said, "enables us to maintain efficient service at little cost. There is no unfavorable publicity. On the other hand there have been attempts on the part of lay organizations to set up their own eye banks independently and these, we believe, are unfortunate. However sincere and honest the motives that inspire such projects they do confuse the public and divide interest and support. Of course we do not want to block any constructive effort but it must be emphasized that maintaining an eye bank is a tremendous responsibility which should be undertaken only under strict medical supervision. We hope that the doctors in local communities will become increasingly interested in our national program and guide the efforts of public-spirited laymen in the right direction."

It is believed that the Eye-Bank's new national advisory committee will lend strong support to the program's objectives. The ophthalmologists serving on it represent a cross section of the country, as follows: Michael J. Hogan and S. Rodman Irvine of California; Derrick Vail, Illinois; James H. Allen, Louisiana; Alan C. Woods and M. Elliott Randolph, Maryland; Edwin B. Dunphy, Massachusetts; A. D. Ruedemann, Michigan; M. Hayward Post, Missouri; John H. Dunnington, John M. McLean, and R. Townley Paton, New York; Frederick W. Stocker, North Carolina; Harold G. Scheie, Pennsylvania; and Everett L. Goar, Texas.

History of Corneal Grafting

In an address before the 1953 Annual Conference of the National Society for the Prevention of Blindness Dr. Paton, the Eye-Bank's vice-president, outlined the history of the corneal grafting operation. It dates back to 1789 when Pellier De Quengsy attempted to construct an artificial cornea out of glass and support it with a rim of silver. This operation was unsuccessful but it did attract the attention of subsequent investigators and

eventually led to attempts at total corneal transplantation. Even today this has not met with any degree of success, although progress is being made in that direction.

In about 1841 eye surgeons began developing the present technique. "However," Dr. Paton said, "they were utilizing largely as donor material the corneas of dogs, cats and pigs which we know now cannot be used because they do not remain transparent. Only the human cornea can be successfully transplanted. Today in the larger eye clinics all over the world a standard procedure is employed on selected cases.

"Unfortunately many people have a misconception of this operation and think that it will restore vision to any blind person. Actually there are relatively few people who can be helped by it. Only the highly trained observer can tell whether a scarred cornea can be successfully removed and a new one put in its place. An example of a successful case is that of a young girl who had been stabbed in the eye with a pair of scissors. This accident had left a horrible, disfiguring scar and very little vision. Two months after the operation the cornea was clear."

Sometimes for various reasons a graft becomes cloudy a few months after the operation In such cases another one has been performed and a successful result obtained. In fact, in some instances the graft has been done three times before it remained clear.

Dr. Paton said that the operation has been particularly successful in cases of keratoconus. "This is an eye condition," he explained, "in which the cornea, for some unknown reason, becomes elastic; it stretches and a cone develops, leading to blindness in a few cases. Contact lenses will sometimes bring vision up to normal, but not always. In a series of 100 recent cases, 89 per cent had clear grafts. With this percentage we certainly consider that the operation is within the field of safety and good judgment.

"Persons who have corneal dystrophy, a disease that is usually familial, gradually lose their sight and are unable to read. Success with the corneal graft can be obtained in about 86 per cent of these cases. In cases of scars of varying degree we get about 67 per cent good results; in interstitial keratitis, 65 per cent; in cases of old penetrating injuries or trachoma, under 50 per cent."

Twenty years ago, Dr. Paton said, no cases were followed up for more than five years, and many eye physicians were skeptical as to maintaining transparency in a graft for more than a few months. Now the operation is more or less commonplace. In future it will be performed on more patients with increasing success. In the course of time, it is believed, larger grafts will be possible, and accumulated knowledge will help in the selection of cases.

"It is difficult to avoid dramatization of the operation," said Dr. Paton, "because of course it is a wonderful thing to restore sight; but it is tragic to raise false hopes in blind people who cannot be helped in this way. As I said before, only the ophthalmologist highly trained in this field can select the cases that have good chance of success, and they are limited in number."

Training in Operative Technique

Each year the Eye-Bank provides a training course in the techniques of the corneal transplant operation for a group of 12 eye surgeons who come

from all sections of the country. Resident doctors are also being trained in the affiliated hospitals and other hospitals that have eye departments.

The Corneal Clinic in the Manhattan Eye Ear & Throat Hospital, sponsored by the Eye-Bank, has grown in the past six years from a few patients a week to 30 or 35. Many who visit the clinic for diagnosis of corneal conditions are referred by ophthalmologists at distant points as well as in New York. The first examination is made free of charge.

Donating Eyes

Anyone wishing to donate his eyes after death may obtain from The Eye-Bank for Sight Restoration, Inc., at 210 East 64th Street, New York 21, the proper instructions and a form of release which is to be signed. The gift should not be made part of a will, since eyes must be used before wills can be probated.

Other inquiries concerning the Eye-Bank's objectives and program may be addressed to Mrs. Aida de Acosta Breckenridge, executive director.

Catholic Schools' Program

A vision conservation program was initiated in New York City's Catholic schools last fall. Two representatives from each school attended meetings in Manhattan, the Bronx, and Richmond to be oriented in methods of vision testing. The two hours of discussion dealt with the aims and technique of visual acuity testing, type of equipment used, physical aspects to consider, recording and interpretation of data, and procedure for referral of cases requiring eye care. In addition to acuity tests, the significance of the general appearance of the eyes, muscle coordination, and pupillary reaction to light were discussed.

Lightmeters are being made available to all Catholic schools to determine the adequacy of lighting in the classroom. A form is provided for recording lighting conditions with and without the use of electric lights. Records are to be made of conditions at different hours on clear and cloudy days in all parts of the room; the color of walls and ceilings; the height of ceilings, size of the room, color and finish of desks, and color and size of chalk boards.

Pennsylvania Merger

The Philadelphia Committee for Prevention of Blindness and the Pennsylvania Working Home for the Blind recently joined forces. The affiliation was announced jointly by Robert F. Irwin, Jr., president of the POB committee, and F. Sturgis Stout, president of the Working Home.

The prevention of blindness program will continue under the guidance of a medical advisory board, and will form a new department in the Working Home under the direction of R. Earl Barrett, superintendent. The Working Home, the oldest organization of its kind in North America, is the official center for rehabilitation of blind persons in Pennsylvania.

The POB committee was incorporated in 1939 to create "more general awareness of the causes of blindness and promote measures to control these causes." One of its major programs has been the mass screening for glaucoma among older persons. This project was begun in 1944 and carried out in major department stores, insurance companies, and industrial plants.

SIGHT RESTORATION
Under the California State Program

W. A. PETTIT, M.D.

California State Ophthalmologist

Good results obtained in hundreds of cases of cataract surgery are evidence of the wisdom of legislature and governor in authorizing and financing this activity.*

THE California Department of Social Welfare has sponsored cataract surgery for 937 persons since 1939 when the state legislature authorized this program. In 700 of these cases records are now complete enough to justify reasonable conclusions as to the individual benefits received.

Provisions of State Code

The state Welfare and Institutions Code (Section 3051) provides that:

"The State Department of Social Welfare may provide for treatment or operation to prevent blindness, or restore vision to applicants for, or recipients of, Aid to the Blind who voluntarily request and make written application for such treatment or operation.

"This service shall be extended only to those persons whose age and physical and mental condition will make such physical rehabilitation profitable to the individual, shown by the findings of the physician in the report of the eye examination to be eligible for such treatment, and recommended for such treatment after a full investigation of each case by the advisory committee of ophthalmologists or by an ophthalmologist who has been designated by the advisory committee.

"The treatment or operation recommended shall be given at any hospital or clinic designated by the advisory committee, and necessary traveling expenses shall be allowed as part of the expense of the treatment. The State Department of Social Welfare shall reimburse the county or the eye patient for all necessary expenses incurred in connection with the diagnosis and treatment. Necessary expenses shall include the costs of guide service, maintenance while the patient is away from his home, transportation to the eye physician or hospital and return to his home, and the cost of nursing home care when such is necessary."

Appointment of Surgeons

When the program was initiated applications were received from those ophthalmic surgeons who desired to participate. An advisory committee of prominent ophthalmologists representing both the northern and southern sections of the state reviewed each application and recommended to the state department those surgeons whose

* Digest of a report, *The California State Program for Prevention of Blindness*, prepared by Dr. Pettit and issued by the State of California Department of Social Welfare: Charles I. Schottland, Director. December, 1952.

training, experience and other professional qualifications indicated a desirable degree of professional efficiency. The department appointed a rotating panel of surgeons from those recommended by the committee. After two years' service a surgeon was eligible for reappointment. To date 30 have participated in the program.

In order to establish efficient administrative procedures, treatments for the first two years were limited to San Francisco and Los Angeles. Patients were transported to those medical centers from other counties. Gradually the program was decentralized and surgeons are now active in San Francisco, Los Angeles, Sacramento, San Diego, San Bernardino, Santa Barbara and Fresno. On two occasions when several applicants in the northern end of the state desired treatment, the department paid transportation expenses of a San Francisco surgeon to the nearest community of residence where local ophthalmologists and hospitals were available for postoperative care.

Services Not Duplicated

Early in the program the department recognized the necessity of avoiding duplication of services provided by other state agencies. By agreement with the Bureau of Vocational Rehabilitation all applicants under 50 years of age were first referred to that agency. If it was unable to provide service, the Division for the Blind proceeded with its investigation. The Bureau of Vocational Rehabilitation is authorized to provide treatment to those who can be restored to earning capacity. The Department of Social Welfare is authorized to provide treatment in cases where physical rehabilitation will be profitable to the individual. This terminology in the law was designed to permit treatment of blind individuals whose age or other physical disabilities would prevent their return to industrial activity.

Established Fees

Due to the requirement that a favorable prognosis be established before undertaking surgery, and in view of the restrictions imposed by a limited budget, the program was restricted to specified surgical procedures, and a modest fee was established for each. The participating surgeons accepted their appointments with a full understanding of the conditions.

There are two different fees for cataract extractions: A $150.00 fee includes surgery, final refraction, and postoperative observation and care for 90 to 120 days. For those cases referred by the surgeon, 15 days postoperatively to an ophthalmologist in the patient's community for subsequent observation and refraction, the surgeon's fee is $115.00. The local ophthalmologist is paid $5.00 for office calls and reports of observation, and $10.00 for the final refraction.

Selection of Cases

The State Ophthalmologist identifies individuals having a good prognosis with proper treatment as he reviews the reports of eye examinations submitted with the application for Aid to the Blind. The county of residence and the applicant are notified that the examining ophthalmologist indicated vision might be improved by proper treatment and that the state will pay expenses incident to such treatment.

If the applicant desires to accept the proferred treatment he signs a request. He is then referred to his family physician for a complete physical examination. If this report indicates that restoration of vision would be profitable and that the patient's physical and mental condition are such as to permit the required procedures, he is referred to the nearest available member of the surgical panel. The surgeon makes his own examination and recommendations based upon his findings and the information submitted by the patient's personal physican. If the surgeon desires further studies before operating he is authorized to make or refer the applicant for such studies. If he concludes that surgery is not advisable he is paid for his examinations and the patient is so notified.

If an operation is recommended and the applicant agrees to it, the surgeon thereafter directs and provides all treatments that are indicated. He sends the patient to the hospital and discharges him when he so desires. If nursing home care is needed subsequent to hospitalization, he requests the necessary authorization from the State Department of Social Welfare. He orders temporary glasses when the patient leaves the hospital and 90 days after surgery, if there are not contraindications, he refracts the patient and orders permanent glasses. He may order one pair of bifocals, or one pair each, glasses for distance and for near use. All bills for materials and associated services are paid by the state. If travel expense or an attendant is required the state also pays for these items.

Upon discharging the patient the surgeon submits a complete report of the condition of both eyes, together with his recommendations. Six months after surgery a representative of the county, usually a social worker who has been acquainted with the individual prior to and during his surgical experience, visits him and submits an independent report on the recipient's activities both before and after surgery, as well as his reaction to the procedures.

Average Cost

As of May 1, 1952, the Department of Social Welfare had sponsored 857 surgical procedures for which the total expense of $276,525.67 was paid by the state. The average cost was $322.67.

Age Distribution

Of the 700 patients in this survey, 403 were males; 297 females. The oldest was a man of 95. His visual acuity before the operation was hand motion; after operation 20/60. He was operated upon in October, 1950, at a total cost to the state of $260.29. Aid to the Needy Blind was discontinued February 28, 1951, and he was transferred to Old Age Security. Six months after surgery it was reported that he worked around the home, read, cared for his personal needs and went on the streets alone. Later his other eye was operated upon at no expense to the state.

The youngest recipient was a 29-year-old woman. She had congenital cataracts that limited vision to hand motion and light perception. Following surgery vision was 20/400 in each eye. Six months later the report indicated that this patient was able to do the housework, care for her personal needs, go on the streets alone and attend the movies. The cost to the state was $342.87. This woman was

operated on in January, 1950; has received no public assistance since February 28, 1951.

Acuity Before and After Surgery

Applicants were approved for surgery only when there was no useful vision in the eye in question and when the other eye had less than 20/80. The following tabulation shows visual acuity before surgery in the 700 cases:

Acuity	No. Patients
Light Perception	314
Hand Motion	172
Counts Fingers	39
1/200 to 4/200	71
5/200 to 9/200	25
10/200	33
15/200	8
20/200	38

Visual acuity 90 days after surgery was as follows:

Acuity	No. Patients
20/15	15
20/20	148
20/25	129
20/30	110
20/40	80
20/50	62
20/60	31
20/70	22
20/80	9
20/100	15
20/200	27
15/200	3
10/200	14
5/200	4
3/200	2
2/200	2
Hand Motion	3
Light Perception	20
No Light Perception	4

Cases of Failure

Cases in which vision was not improved 90 days after surgery were considered failures. There were 32 of these —4.7 per cent of the eyes operated upon. In three of these cases a second operation was successful in restoring vision to 20/20, 20/25 and 20/50.

Two of the 32 persons whose vision was recorded as not improved died. Other causes for failure to improve vision were:

Retinal detachments, 6; iridocyclitis, 6; choroidal hemorrhage, 5; postoperative glaucoma, 4; arteriosclerotic retinitis, 3; senile macular degeneration, 1; diabetic retinitis, 1; developed corneal dystrophy, 1; developed epithelial downgrowth, 1; myopic degeneration of choroid, 1; pneumonia with panophthalmitis, 1.

Ages of those whose vision was not improved were: under 65, seven; 65 to 74, thirteen; 75 or over, twelve.

Improvement in Activities

It is a matter of concern that 67 persons have been reported as showing no improvement in their activities six months after surgery. Most practicing ophthalmologists meet this problem in their private patients. An apparently successful operation with no visible pathology in the eye and with the ability to read the letters on the test chart does not result in improvement in the patient's self reliance. It is well recognized that the vision in an aphakic eye is not the same as in the normal eye. The patient must learn to use his new-found vision. Problems of spherical aberration, chromatic aberration, prismatic effects and field limitation are inherent in the heavy lens required by the aphakic eye. Most people learn to overcome these problems fairly easily. In some this ability develops slowly. It would appear that in some of our aged citizens the effort required is greater than their interest. Upon discharge by the surgeon, each recipient receives a letter from the depart-

ment suggesting methods of overcoming these difficulties.

Reports have indicated that 76 individuals were working outside the home six months after surgery. Of these 33 have become self-supporting, six have required the assistance of general relief from the county, five became self-supporting temporarily but later requested Old Age Assistance. These five were self-supporting for the following periods: one month, 19 months, 29 months and 34 months. Sixteen transferred to Old Age Assistance when their sight was restored. In 16 cases Aid to the Blind was discontinued and there is no report of further public assistance. Since there is no aid being received they are either self-supporting are are being supported by relatives.

Aid to the Blind was discontinued in 624 cases because they were no longer eligible. Since each recipient of Aid to the Blind costs the state $1,000 per year, this would indicate a substantial saving in state funds. However, many transfer to Old Age Assistance. This is ten dollars per month less than Aid to the Blind. Some require assistance from general relief.

Patients Express Gratitude

Many letters are received by the department from grateful recipients of this service and these provide inspirational reading. Following are two of the many case histories that stand as evidence of the state's wisdom in authorizing this program.

When Mr. D., age 57, first came to the attention of the Division for the Blind he was despondent over his loss of vision and his hopeless family circumstances. Unable to work, he was forced to depend on his wife's support. During the wife's absence from home their 13-year-old daughter was getting out of hand because the father could not supervise her activities. An operation for the removal of a cataract was recommended for Mr. D. Before surgery his vision was 1/200; after surgery, 20/15. In due course a grateful letter was received from him saying he was back at work. His wife was caring for their daughter in the home they were buying. He has been self-supporting since 1946. Cost to the state: $202.90.

Mrs. M., age 43, had been blind for eight years and depended upon the assistance of a guide dog when she was recommended for cataract surgery. After the operation her vision was 20/40. The day after her discharge from the hospital she telephoned a representative of the Division for the Blind to express her appreciation and to tell how thrilled she was "just sitting in the railway station watching people go by!" Later the Bureau of Vocational Rehabilitation provided surgery for the other eye. She obtained a license to drive a car, trained as an X-ray technician and became self-supporting. Total cost, under this program, was $234.23.

Research at National Institute

The National Institute of Neurological Diseases and Blindness is concerned with brain and spinal cord disorders; neuromuscular disorders; visual disorders such as glaucoma, uveitis and cataract; and hearing impairments. The proposed appropriation of $4,763,000 for the year beginning July 1, 1954, is $263,000 over the 1952–1953 fund. The increase is for full-year operation costs of research begun in 1954.

Recommended Approach to SCHOOL LIGHTING DESIGN

CHARLES D. GIBSON

State of California
Department of Education—School Planning

There is now basic agreement among informed authorities as to lighting requirements for visual comfort and efficiency. An expert in this field outlines basic principles, goals and evaluation procedures that will aid those concerned with planning a new school building or improving old lighting systems.*

MANY factors enter into the intelligent planning of a school building. A plant that represents a medium quality level facility should meet such minimum standards as:

A properly located and adequate site; best possible planning in terms of structural, fire and panic safety; adequate sanitary facilities; provision for decentralization of student groups for saturation enrollment; adequate facilities for a well-rounded educational program; flexible building units providing for future reassignment of space, expansion or contraction; simple and direct traffic patterns with lanes of ample width; practical minimum maintenance requirements.

These factors are emphasized here because they are often overlooked or disregarded by persons primarily concerned with lighting design. They should be considered for two reasons: All design areas must receive studied attention if the plant is to represent a well-balanced solution to a highly complicated problem; and the many factors and controversial elements must be approached with a degree of organization. With this in view a frame of reference, a set of lighting goals and an evaluation procedure will be suggested.

* Digest of a paper presented at the Northern California Section, Illuminating Engineering Society, June 11, 1953.

Frame of Reference

Since the lighting field has become more and more complicated by the introduction of new sources, new applications of old sources and a multiplicity of new materials and techniques, it is advisable to define here certain basic principles:

1. Brightness-balance instead of high footcandle levels is the *prime* consideration in establishing an acceptable visual environment for critical seeing tasks.

2. Visual comfort and efficiency depend upon establishing and maintain-

ing maximum and minimum brightness-differences between the task and areas of high brightness, and between the task and areas of low brightness in a 360 degree visual field.

3. No inhibitions should be placed upon seating or other work station arrangements within the room in an effort to establish visual comfort.

4. High levels of illumination without brightness control do not mean a better visual environment.

5. Sky brightness and ground brightness are the two major daylight sources and both must be controlled in order to produce a positive visual environment for critical seeing tasks.

6. The use of ground brightness as an effective daylight source can be part of the planned design of the school building.

7. The function of electric lighting is to supplement or replace daylighting.

8. Both general light sources should be subjected to the same brightness limitations, and the design of both sources should be coordinated to provide acceptable performance in the completed structure.

9. Maintenance problems created by lighting design must be held to a minimum.

10. Progress in daylight design depends *not only* upon the development of more effective classroom sections but also upon the planned and intelligent integration of all the buildings in a school plant into patterns which guarantee adequate daylight sources as well as sky brightness control.

11. Orientation of buildings alone will not solve the problems of brightness-balance.

12. The building design develops from the correlation of interior and exterior elements which, in combination, produce a comfortable and efficient visual environment.

Lighting Goals

The lighting goals established by the National Council of Schoolhouse Construction are listed here because they reflect the above frame of reference, they are realistic in terms of visual comfort and efficiency, and follow closely the general recommendations of the Quantity and Quality Committee of the Illuminating Engineering Society.

Goal A—The footlambert brightness of any surface viewed from any normal standing or sitting position in the schoolroom should not exceed 10 times the footlambert brightness of the poorest lighted task in the room.

Goal B—The footlambert brightness of any surface viewed from any normal standing or sitting position in the schoolroom should not be less than one-third the footlambert brightness of the poorest lighted task in the room.

Goal C—The footlambert brightness of any surface immediately adjacent to the task should not exceed three times the task brightness.

Goal D—Brightness-difference between adjacent surfaces should be reduced to a minimum.

Goal E—The brightness goals stated above assume a lighting system that provides from 20 to 40 footcandles on the poorest lighted task. As footcandle levels are increased, sources of high brightnesses should be controlled to approach more nearly the brightness of the task. The extent of the area of the surface producing brightness has a measurable effect upon visual comfort. Small areas of either extreme of

brightness generally are less noticeable than large areas of the same brightness.

The term *task*, as used in the above definitions of goals, is interpreted to include any visual task which may be encountered in a schoolroom. For example a task might be a book on the student's desk; the written symbols on the chalkboard; demonstration or experimental apparatus in a laboratory; an art assignment on an easel or exhibit material on a tackboard; a motion picture or a lantern slide. On the basis of this concept, it is apparent that the tasks may be in either a horizontal or a vertical plane and may require the student to face in any direction. Visual tasks in schoolrooms range in brightness-difference from reading black symbols on white paper to sewing with black thread on black cloth. Other factors remaining constant, visual comfort and efficiency increase with the increase in brightness-difference within the task.

Evaluation Procedures

Just having an acceptable frame of reference and a set of lighting goals will not solve any of our lighting design problems. However, if we *use* these two tools as a basis for evaluating proposed systems, we will eliminate in the design stage many of the mistakes of the past. Many designs which appear to be good from an architectural point of view would fall far short of acceptable standards for visual comfort and efficiency if evaluated against these tools.

When there is doubt as to how effective a material, a technique or piece of equipment would be when applied in a design, it should be checked against the frame of reference and lighting goals. The consistent use of such an evaluation procedure would result in an immediate and appreciable upgrading in both daylighting and electric lighting equipment and techniques. Lighting systems that meet the recommended brightness-balance goals should be considered as an integral part of the school building. They should not be considered expendable in order to provide funds for less necessary educational and architectural features.

The acceptance and use of the recommended evaluation procedure also would stimulate far greater inter-communication among the groups concerned with this problem, forming a basis of more sympathetic communication.

The use of such a procedure also would lead to a uniform method of recording the results of lighting design. Lack of this now causes much confusion and misinformation.

Current Trends

I should like to make a few observations which reflect current trends and future developments in the area of school lighting.

Daylight and electric light will be considered as a complementary team of energy sources working toward the same goals; they will be coordinated in the basic design pattern. Adequate controls for all daylight and electric light sources will be considered a prime part of the design problem and will quit their current roles as appendages and alternates or afterthoughts.

We will begin our design thinking in terms of our best results to date; then on the basis of progress already made we will further refine good solutions, taking them further toward goals.

Design experimentation will continue, but it will be based upon defensible and objective goals rather than upon an impelling urge to be different or to use propagandized equipment, materials or techniques.

All the attempts at improving lighting design made to date have contributed much to our current knowledge. Some have demonstrated dramatically what *not* to do. Others represent steps ahead, and have produced environments that enable us to study at firsthand the characteristics of visual comfort.

Today greater opportunities than ever before are available to those who will evaluate seriously school lighting design against the reference tools recommended here. There is basic agreement among informed authorities as to the requirements of an environment that creates visual comfort and efficiency for the performance of critical seeing tasks. The school design which in future results from the coordinated effort of architects, engineers and planning agencies will truly represent the best considered evaluation of all the factors involved.

New York's New Program

Hospital care for children handicapped with certain visual impairments is provided under a recently inaugurated program of the Bureau for Handicapped Children of New York City's Department of Health. About 100 conditions in children from birth to 21 years of age are cared for. Payment in part is expected from the family whenever possible.

Further information may be secured from Helen M. Wallace, M.D., director of the Bureau.

LENSES FOR 3-D MOVIES

The Executive Committee of the New York Academy of Medicine on November 23, 1953 approved the following report on polaroid lenses used for viewing 3-D pictures:

The Committee on Public Health Relations of The New York Academy of Medicine has considered the request from the Commissioner of Health for advice as to the need for measures to control the promiscuous use of lenses for the viewing of three-dimensional motion pictures.

Ophthalmologists have reported seeing cases of conjunctivitis in persons who had used such lenses, which are passed on from one patron to another in the theater. Some of the infections reported were instances of bacterial conjunctivitis, but at least one person was said to have had epidemic keratoconjunctivitis, that is of viral origin.

The transmissibility of pathogenic organisms from one person to another by means of articles of personal use is well established. This principle is the basis of such public health measures as prohibition of the common drinking cup and the common towel. The passing of spectacles from one person to another is on a par with these outlawed and outmoded practices. Since some of the spectacles furnished in theaters consist of plastic lenses in paper frames, there is no satisfactory method by which they can be sterilized.

In view of the danger of spreading serious eye infections, the Committee is of the opinion that the re-use by different persons of the polaroid lenses distributed in motion picture houses for the viewing of three-dimensional motion pictures should be prohibited.

BLINDNESS IN PRESCHOOL CHILDREN

C. EDITH KERBY

Associate for Statistics and Analysis
National Society for the Prevention of Blindness

As in the case of previous studies of the school-age group, this study shows that substantial progress is being made in reducing blindness due to known causes. The greatest need is for research into the causes and the means of preventing blindness in infants.

NOT since a report featuring information about blind children in New York State gave the impetus for organization of the National Society for the Prevention of Blindness in 1908 have so many persons been so deeply concerned about blindness in young children as in recent years.

The purpose of this paper, and of the statistical study of cases of blindness in children under seven years of age on which it is based, is to attempt to answer the questions: How many young blind children are there in the United States? What are the causes of their blindness? Is blindness in this age group actually increasing at an alarming rate? What caused the increase?

Facts About the Study

A series of studies of causes of blindness in children of school age has been published over a period of 20 years. That no similar study has been made covering the infant and preschool age is due in part to the fact that registers of the preschool blind were either nonexistent or incomplete in most states, and in part to the fact that analysis of the school group had produced reasonably satisfactory data on causes of blindness in the early years of life, since in three out of four cases blindness occurred in those early years. The situation has now changed. Beginning in the middle 1940's the rate of blindness in infants was seen to be increasing due to a cause which had previously appeared too infrequently to be recognized as an entity. Most of the affected children have not yet reached school age. Studies of children of school age are no longer adequate to show what is happening among young children. Thus the need for a study of the infant and preschool blind became evident.

Fortunately by 1950 services for the young blind child had been developed in many states. It seemed reasonable to assume that agencies providing these services would have obtained a record of the ophthalmological exami-

TABLE I

Sources and Disposition of Case Records

State	Agencies supplying case records	Total records received	Subtracted on account of				Additions		Cases included in the study
			Age	Vision	Duplication	Trans. *out* to state of birth	Trans. *in* to state of birth	Schools for blind	
Cal.	School for Blind Variety Club, Blind Babies Foundation	225	17	2	3	9	8	48	250
Conn.	Board of Education of the Blind	95	1	2	1	5	8	5	99
Del.	Commission for the Blind	26	..	..	..	2	1	1	26
Ill.	Div. of Child Welf., Dept. of Public Welfare Soc. Serv. Dept., University of Chicago Clinics	200	1	5	..	7	5	15	207
Me.	Services for Blind, Dept. of Health and Welfare	21	..	2	..	2	1	..	18
Md.	Society for the Prevention of Blindness Soc. Serv. Dept., Wilmer Oph. Institute	115	..	8	..	8	5	8	112
Mass.	Div. of the Blind, Dept. of Education	290	5	8	..	16	6	1	268
Minn.	Serv. for the Blind, Div. of Soc. Welfare	110	3	1	3	4	2	4	105
N. H.	Sight Conserva. Program, Dept. of Pub. Welfare	21	..	..	..	1	2	1	23
N. J.	Dept. of Educa., Commission for the Blind	259	10	..	7	40	11	..	213
N. Y.	Com. for the Blind, Dept. of Social Welfare	473	..	..	2	9	23	27	512
N. C.	Commission for the Blind	101	2	..	..	8	3	4	98
Pa.	Council for the Blind Western Pa. School for the Blind Some Branches of Pa. Assoc. for the Blind	388	19	14	19	16	11	10	341
Vt.	Services for the Blind, Dept. of Soc. Welfare	25	3	..	4	2	1	1	18
Wash.	School for the Blind Div. for the Blind, Dept. of Public Assistance	78	..	..	..	3	2	7	84
T. H.	Bur. of Sight Conserva. & Work with the Blind	35	..	..	..	..	2	1	38
D. C.	Clinic for Soc. Adjust. of Vis. Hdcpd. Presch. Ch.	27	..	..	1	16	2	3	15
Ind.	Department of Public Welfare	120	1	90	2	..	1	1	29
Iowa	Board of Education	46	..	2	..	5	1	8	48
La.	Div. for the Bl. & Sight Conserva., Dept. Pub. Welfare	29	1	1	..	2	2	3	30
Mich.	School for the Blind	90	..	1	3	1	2	40	127
Ohio	Dept. of Public Welfare School for the Blind Cleveland Board of Education Franklin Co. E.E.N.& T. Soc.—Study of RLF	68	2	4	..	2	5	15	80
Tenn.	Div. of Serv. for the Blind, Dept. Pub. Welfare	30	..	5	..	..	..	1	26
Va.	School for the Blind	22	..	2	..	1	19	4	42
	Other states (not included in study)	..	..	..	..	..	(36)	..	..
	Total	2,894	65	147	45	159	123	208	2,809

nation for each blind child on the register. As it is their objective to help all such children, they are also most likely to have a reasonably complete count. Hence these agencies, rather than individual ophthalmologists, were asked to supply the case records for children under seven years of age as of December 31, 1950.

The first requests were addressed to state divisions responsible for services for the blind. If the latter were unable to supply all of the case material required for the study, other sources were approached. In several states two or more agencies cooperated to provide records of the blind children in their state. In at least two states, where no register existed, case finding projects were instituted so that they might be included. The agencies to which we are indebted for case records used in this study, are listed in Table I. They include divisions of services for the blind in state departments of social welfare, commissions, councils, schools and associations for the blind, hospitals, and societies for the prevention of blindness.

It is unusual in any study of this nature to be able to secure more than a comparatively small sample. Judged by this standard, our sample is not small, especially since a prerequisite for the study was the existence of a reasonably complete census of the blind of preschool age. States not included are those in which state-wide services for the preschool blind had not been organized as of the date of the study.

More than 2,800 records were received from 22 states, the District of Columbia and the Territory of Hawaii. In this area there were 65 per cent of the children under 7 years of age in the United States. Because of incompleteness of the case count for six states and the District of Columbia, and inadequacy of the diagnostic information

TABLE II

Distribution of Preschool Blind by Cause of Blindness—1943 and 1950

Cause of Blindness	Per cent of Preschool Blind as of		
	12/31/43	12/31/50	
	11 States*	11 States*	16 States†
Infectious diseases	9.7	4.3	4.1
Injuries	5.3	2.4	2.8
Tumors	4.8	2.4	2.7
Prenatal influence	62.6	37.4	37.5
Unknown to science			
Retrolental fibroplasia	6.7	48.3	46.6
Other and not specified	10.9	5.2	6.2
All Causes—Per cent	100.0	100.0	100.0
Number	834	1,317	2,412

* Includes states for which similar data for children born between 1/1/37 and 12/31/43 are available from studies of the school-age group. These eleven states are: California, Delaware, Illinois, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, North Carolina, Vermont, and Washington.

† Includes 16 states from which the most complete records were available. (See Table IV.)

TABLE III

Distribution of Preschool Blind by Degree of Vision Remaining

Degree of Vision	Per cent of total
Absolute blindness	24.4
Light perception only	26.4
Motion perception and form perception up to but not including 5/200	11.2
5/200 up to but not including 10/200	4.2
10/200 up to but not including 20/200	3.6
20/200	4.3
Better than 20/200 with peripheral limitation	1.0
Not reported	24.9
Total—Per cent	100.0
Number	2,809

available on cases in one other state, only fifteen states and the Territory of Hawaii could be included in some of the detailed tabulations. This more complete sample covering cases in 16 states accounted for 44 per cent of the children under 7.

For comparison, and to show trends, we also analyzed a similar group of cases occurring in the seven-year period immediately preceding the date of the current study. Case records included in this count were those which had been made available for studies of the school-age group mentioned above. From these we selected all records of blind children which showed that the child had been born between January 1, 1937 and December 31, 1943 and that blindness had occurred before the latter date—i.e., under seven years of age. This portion of the study was necessarily limited to the 834 cases from the 11 states for which such case material was available. As this group of states covers the blind in approximately one-fourth of the population under school age in the United States, and as the figures for 1950 for these 11 states were quite similar to those for the 16 states in the larger sample (see Table II) the comparisons would appear to be valid.

In our original request we had asked for case records of partially seeing children, as well as the blind. However, when it was noted that agencies supplying records had included only an occasional case of this type, these were eliminated and the study was confined to the blind only. (See Table I.)

Definition of Blindness

The definition of blindness in general use for administration of programs for the blind in the United States is, briefly, central visual acuity of 20/200 or less in the better eye, or better than 20/200 central vision if the widest diameter of the visual field is no greater than 20 degrees.* It seemed advisable to try to apply this definition for the purposes of this study, even though it was anticipated that none of the infants or very young children in this

* This means that the smallest letter or object a blind person could recognize is at least 10 times the size of that seen by persons with normal vision, or that everything beyond what might be seen through a cone six inches long and 2⅛ inches across its broad end is blocked from his view.

age group would have had vision tested by the Snellen test. To obtain a practical measurement of the young child's vision the following item had been added to our case record forms:

> "If visual acuity is not known, but child sees objects, mention the minimum size of object and the maximum distance at which it is seen."

This proved helpful in determining the approximate vision in many cases, but we were still faced with the problem of deciding whether to include as "blind" many other children for whom no estimate of their visual ability as such had been recorded. In any case in which the diagnosis included detailed description of the parts of the eye affected and the nature of affection, it

TABLE IV

Blindness Rates in the Age Group Under 7 Years, By State
As of December 31, 1950

State*	Number Blind		Rate per 100,000 population under 7 years	
	All Causes	Retrolental Fibroplasia	All Causes	Retrolental Fibroplasia
Delaware	26	18	55.1	38.1
Massachusetts	268	151	42.9	24.2
Hawaii	38	16	41.3	17.4
Connecticut	99	71	37.0	26.5
New Jersey	213	79	34.3	12.7
Maryland	112	56	33.3	16.7
Vermont	18	2	31.6	3.5
New Hampshire	23	11	30.7	14.7
New York	512	216	26.7	11.3
Pennsylvania	341	144	23.7	10.0
Washington	84	42	23.5	11.8
Minnesota	105	41	22.9	8.9
Illinois	207	125	17.7	10.7
California	250	130	16.6	8.7
North Carolina	98	17	14.3	2.5
Maine	18	5	13.1	3.6
Subtotal‡	2,412	1,124	24.6	11.5
Michigan	127	32	13.2	3.3
Iowa	48	17	12.4	4.4
Washington, D. C.	15	8	10.4	5.5
Virginia	42	14	†	†
Ohio	80	30	†	†
Louisiana	30	12	†	†
Indiana	29	2	†	†
Tennessee	26	1	†	†
Total	2,809	1,240	..	..

* All cases have been referred to the state of birth, and the population under seven years has been computed from annual data on births and deaths, by states, published by the National Office of Vital Statistics.

† The sample from these states was too small for computation of their rates.

‡ The subtotal is based on 2,412 cases in the 16 states from which the most complete records were available.

was comparatively easy to tell whether the child's eyes were so badly affected that he might be presumed to fall within the definition of blindness. Also, if the diagnosis was *not* given in detail a child was included as "blind" if he had been so designated by the reporting agency, unless the record showed an eye affection that appeared to be of a minor nature, or that only one eye was seriously involved.

Degree of Vision

Of the 2,809 children in the study, about half were reported as totally blind or having light perception only; one quarter as having some useful vision, ranging between perception of motion and the borderline of blindness. (See Table III.) For the remaining 25 per cent, information on the records was not sufficient to permit classification by degree of vision, although they were accepted as probably blind on the basis of the criteria already mentioned. The distribution by degree of vision was practically the same for the total group as for the cases in the 16 units supplying the most complete records. This indicates that the problem of obtaining a reasonably accurate evaluation of the limitations of function of the child who is too young to respond to a formal test is universal. Nevertheless, such information is important, not merely for statistical purposes, but as an aid to parents and workers who are responsible for guiding the development of these visually handicapped youngsters. It would be helpful if the eye specialist would provide some information, based perhaps on his interpretation of the child's responses to visual stimuli and of the significance in terms of limitations in central or peripheral vision of the defects he sees in the eyes.

Blindness Rates by State

At this time there is no way of checking on completeness of the count of cases of blindness reported for the states listed in Table IV. There may well be some error in the figure shown

TABLE V

Distribution of Preschool Blind by Age and by Age at Onset of Blindness*

Age (as of 12/31/50)	Total under 7 years	Total Per cent	Age at Onset of Blindness			
			Prenatal	Under 1 year	1 year to, but not, 4 years	4 years and over
			Per cent of total†			
Under 1 year	269	100.0	19.2	80.8	..	..
1 year	354	100.0	20.3	78.8	.9	..
2 years	373	100.0	26.2	70.6	3.2	..
3 years	375	100.0	31.6	65.2	3.2	..
4 years	386	100.0	37.8	58.8	3.1	.3
5 years	303	100.0	50.2	41.1	6.0	2.7
6 years	333	100.0	57.6	35.7	3.0	3.7
Not reported	19	100.0	46.7	53.3	..	..
Total under 7 years	2,412*	100.0	34.4	62.0	2.7	.9

* Based on cases reported from 16 states which supplied the most complete information. (See Table IV.)

† Excludes cases in which age at onset of blindness was not reported.

for every state, but it is believed to be much smaller in most of the 16 units included in the subtotal than those at the bottom of the list. Although the prevalence rates have been computed for them, Michigan, Iowa and the District of Columbia did not have adequate state-wide coverage in their counts. This may also be true of North Carolina, California and Illinois, for which comparatively low rates are shown. The latter have been included in the group from which the general average was computed because their service and case-finding programs are extensive.

A wide variation between the states in the rate of blindness among the population under 7 years of age is seen in Table IV. Some of this difference may be due to variations in adequacy of case-finding, as mentioned above, but the figures for retrolental fibroplasia rates indicate that most of the high rates are due to high prevalence of that affection. (See also page 27.) We have reason to believe that additional retrolental fibroplasia cases are concealed in "all other causes" because cases of retrolental fibroplasia occurring in the early years of the study period and those examined by an ophthalmologist who has had little or no experience with it might have been designated in some other way.

How Many Blind Under 7 Years?

If the average blindness rate found in our study sample can be projected to the entire country, the number of blind children under 7 years of age in the United States as of December 31, 1950 was approximately 5,500. If blindness in this age group has continued to occur at the same rate, the total would be somewhat over 6,000 by the end of 1953. Stated in another way, this means that in recent years approximately one child out of 4,000 born in the United States has become blind before reaching his seventh birthday.

Age at Onset

Only when blindness is total and is either noted as present at birth or occurs suddenly, as in cases of severe injury, is it possible to date accurately the time when blindness occurred. Even an oculist has difficulty in determining how well an infant or very young child can see. Since his vision cannot be tested in the usual way, it is necessary to evaluate the child's visual efficiency by watching his reactions to visual stimuli. The eye specialist has the advantage of being able to examine the interior of the eye and consider the probable effect on vision of the defects he sees. However, his examination would not necessarily suggest when blindness occurred, if the child is already blind when first brought to him for examination. The best he can do is to judge what may have happened from information given by the parents and his knowledge of the eye affection. Later information might well change his opinion, as happened when the eye disease occurring in premature infants, at first believed to be present at birth, was later shown to occur a few weeks after birth in most cases.

Being aware of the chances of error in recording of this item on the records, we felt that it was unwise to accept at face value the information as given. Instead, records were edited so that diagnosis and age at onset would be brought into agreement. Thus a case of retrolental fibroplasia examined in the early years of the study period and labelled as of congenital

origin or age at onset unknown was changed to under one year. Also cases of developmental defects that are not of a progressive nature were classified as prenatal, rather than age at the time first noticed or unknown. These adjustments may seem somewhat arbitrary. Nevertheless they give a closer approximation of the truth.

Most of the blindness in these children occurred during fetal life or during the first year of life. As will be noted in Table V, the figure, based on the total of known cases in the units supplying most complete records, was 96 per cent occurring under one year of age for the total. It is only slightly less (93 per cent) if we consider only the six-year-olds who were old enough to have been exposed to blindness at the later ages.

Causes of Blindness

The classification developed by the Committee on Statistics of the Blind was used in this, as in all previous studies. It shows in cross-classification both the types of eye affections and their underlying causes, or etiology. Because this large tabulation cannot be reproduced on pages of this size, it has been condensed to show only the most significant causes. (See Table VI.)

It will be noted that one eye disease caused nearly half of the blindness in children. This is retrolental fibroplasia, which affects chiefly premature infants. It was previously thought to be due to some unknown factor affecting development of the eyes in the prenatal period, which might also have been responsible for the premature birth. Now that it has been established that it usually occurs 3 to 6 weeks after birth, some factor in early life is believed responsible.

Research, carried on in several medical centers throughout the country, is checking on the theories that have been advanced regarding the cause or causes of retrolental fibroplasia. Some of the research experiments are necessarily confined to work with animals. The next step is to test the theory that the means by which an eye affection similar to retrolental fibroplasia can be induced in animals is also responsible for retrolental fibroplasia in infants. Although it is hoped that they will do so, these studies have not yet established conclusive proof of the cause.

It is to be hoped also that similar coordinated research projects will discover some of the other unknown factors in blindness among children. We are especially interested in learning more about the group now classified as "prenatal influence, cause not specified," because it is known only that the eye affections were present at birth. These cases account for 29 per cent of blindness in children. They include chiefly various types of structural anomalies, such as buphthalmos (the large eye which is the congenital form of glaucoma), microphthalmos (the abnormally small eye), anophthalmos (absence of the eyes), albinism (lack of pigment in eye tissues), aniridia (absence of the iris), coloboma (a cleft or hole in some portion of the eye), or a combination of several defects in structure. They include also congenital cataract, dislocated lens and degenerative changes seen in other parts of the eye. It will be noted that in some cases of the types mentioned the cause is given. Some are hereditary, others are due to some infectious disease such as rubella, or German measles which, when it occurs in the early months of a mother's pregnancy, may affect the

TABLE VI

Percentage Distribution of Blind Under 7 Years of Age, by Cause†

ETIOLOGY	Site and Type of Affection											
	ALL CAUSES	EYEBALL, IN GENERAL	Structural anomalies	Other	CORNEA	IRIS AND CILIARY	CRYSTALLINE LENS	CHOROID AND RETINA	Retrolental fibroplasia	Other	OPTIC NERVE, VISUAL PATHWAY, AND CORTICAL VISUAL CENTERS	MISCELLANEOUS AND ILL-DEFINED
ALL CAUSES	100.0	19.7	17.2	2.5	.8	.7	9.8	52.4	46.6	5.8	11.1	5.4
INFECTIOUS DISEASES	4.1	.7	.3	.4	.4	.1	1.0	.6	..	.6	1.0	.3
Rubella (German measles)	1.2	.4	.3	.1	*	..	.8	..	..	..	*	..
Toxoplasmosis	.6	..	..	..	..	..	..	.6	..	.6	..	..
Meningitis	.6	..	..	..	..	*	..	..	..	..	.5	.1
Ophthalmia neonatorum	.4	.2	..	.2	.2	..	..	..	..	..	..	..
Syphilis	.3	..	..	..	.1	.1	*	*	..	..	*	*
Other and not specified	1.0	.1	..	.1	.1	*	.1	*	..	..	.5	.2
INJURIES	2.8	.2	..	.2	*	.3	.1	.1	..	.1	1.9	.2
Birth processes	1.7	.1	*	.1	..	..	.1	*	..	..	1.3	.2
Play or sport	.4	.1	..	.1	..	.2	..	..	..	..	.1	..
Other and not specified	.7	..	..	..	*	.1	..	.1	..	.1	.5	*
TUMORS	2.7	..	..	..	..	..	..	2.1	..	2.1	.6	..
GENERAL DISEASES	.3	..	..	..	..	..	*	.2	..	.2	.1	..
PRENATAL INFLUENCE, not elsewhere classified	37.5	18.3	16.8	1.5	.2	.2	8.6	2.3	..	2.3	6.3	1.7
Hereditary origin, established or presumed	8.4	4.1	3.5	.6	..	.1	2.4	1.0	..	1.0	.5	.3
Prenatal, cause not specified	29.1	14.2	13.3	.9	.2	..	6.2	1.3	..	1.3	5.8	1.4
UNKNOWN TO SCIENCE	47.0	.3	..	.3	..	..	..	46.7	46.6	.1	..	..
ETIOLOGY UNDETERMINED OR NOT SPECIFIED	5.5	.1	..	.1	.2	.2	.1	.4	..	.4	1.3	3.2

† Based on 2,412 cases in 16 states from which the most complete records were available. (See Table IV.)

• Less than one-tenth of one per cent.

development of her baby's eyes. Probably more cases should be classified in these categories if the facts were known. It is equally probable that there are still other factors affecting the development of infants' eyes that have not yet been identified. Hence, the need for research.

In this group of preschool blind 8 per cent were classified as of hereditary origin, but it is quite likely that the true percentage is higher. The defects in eye structure which are present at birth are often found to be inherited when family histories are on record. However, it is not now routine practice to check for similar defects in other members of the family so that this factor may be either ruled out as the cause of blindness, or the pattern of heredity determined and used to enlist the cooperation of members of the family in preventing transmission of a defect known to be hereditary. Investigations should be more thorough. Also, some practical means must be devised to bring together all information concerning any affected family.

As seen in Tables II and VI, infectious diseases in this study account for only 4 per cent of blindness in children under school age. This figure reflects the marked reduction that has been noted in our studies of the blind of school age. To cite only a few examples: before the National Society for the Prevention of Blindness was organized in 1908, ophthalmia neonatorum alone was responsible for 28 per cent of the blindness among new pupils entering schools for the blind; our first detailed study of school-age blind in 1933–34 showed 11 per cent due to ophthalmia neonatorum; by 1950 it was down to about 1 per cent among new pupils. The total for all infectious diseases, which was 29 per cent as of 1933–34, had dropped to 9 per cent among new pupils by 1950. The decrease in the injury rate is similar to that noted in studies of the blind of school age.

It will be seen in Table VII, in which the blindness rates in children under seven years of age as of 1943 and 1950 are compared, that there has

TABLE VII

Preschool Blindness Rates by Cause of Blindness—1943 and 1950*

Cause	Rate per 100,000 births	
	1937–43	1944–50
Infectious diseases	2.0	1.0
Injuries	1.1	.6
Tumors	1.0	.6
Prenatal influence	12.9	8.5
Unknown to science		
Retrolental fibroplasia	1.4	10.9
Other and not specified	2.2	1.2
All Causes	20.6†	22.7†

* Based on 11 states for which data are available for children born between 1937 and 1943. (See Table II for list of states.)

† These rates, if based upon children surviving to December 31, 1943 and December 31, 1950, respectively, would be about 5 per cent and 4 per cent higher.

TABLE VIII

Distribution of Preschool Children with Blindness due to Retrolental Fibroplasia by Weight at Birth

Weight at Birth	Per cent of	
	Total Cases	All Cases Reporting
1 lb. up to, but not, 1½ lbs.	.6	1.0
1½ lbs. up to, but not, 2 lbs.	3.4	5.3
2 lbs. up to, but not, 2½ lbs.	12.8	20.2
2½ lbs. up to, but not, 3 lbs.	17.3	27.2
3 lbs. up to, but not, 3½ lbs.	12.8	20.1
3½ lbs. up to, but not, 4 lbs.	8.5	13.4
4 lbs. up to, but not, 4½ lbs.	4.1	6.5
4½ lbs. up to, but not, 5 lbs.	1.3	2.0
5 lbs. up to, but not, 5½ lbs.	.6	1.0
5½ lbs. and over	2.0	3.2
Weight not reported	36.6	..
Total—Per cent	100.0	100.0
Number	1,240	786

been a decrease in all causes except retrolental fibroplasia. However, a portion of the decrease shown for tumors and cases of developmental defects due to prenatal influence and a corresponding amount of the increase in retrolental fibroplasia probably should be discounted. Cases of this disease seen before the term retrolental fibroplasia had come into use would of necessity have been diagnosed differently. If seen in the early stages, these cases would resemble retinoblastoma. In the final stages, the retina might no longer be visible, but buphthalmos and other defects commonly seen in the maldeveloped eye would be noted.

Birth Weights

An attempt was made to check on the factor of prematurity by including on the record form questions regarding birth weight and length of the gestation period. These items were seldom given except in cases of retrolental fibroplasia and were omitted in 37 per cent of the latter cases as well. Moreover, it proved impossible to find overall data on weights at birth and survival rates needed for computation of blindness rates by birth weight. On the chance that our data on birth weights can be used for this purpose at a later date, the figures are shown in Table VIII.

It should be noted that the small percentages given for cases in the heavier weight groups indicate that occasionally cases of retrolental fibroplasia do occur among larger infants, but do not show their frequency. The small percentages of cases in the very low weights are even less indicative of the frequency, as only a very small proportion of infants are in these weight groups and their survival rate is exceedingly low.

Trends in Blindness in Preschool Children

As has been pointed out in the comparison of the figures as of 1943 and 1950 (see Table VII) the marked increase in the incidence of retrolental fibroplasia has been largely offset by

the decreases in other causes. The net effect of these compensating changes is, therefore, that the blindness rate increased only 10 per cent (from 20.6 to 22.7 per 100,000 births) in the 11 states for which comparative data are available.

Why then do we have reports from various schools and agencies for the blind indicating that they now have many more young blind children under their care? One reason for this is a factor which is not generally appreciated. It is the effect of the increase in the population under 7 years of age that occurred between 1943 and 1950, due to a substantial rise in the birth rate since the end of World War II. The increase in births was found to be 43 per cent for 11 states and 33 per cent for the entire United States.

Another factor which must be considered is that the number of cases of blindness due to retrolental fibroplasia is actually very high in some states, but quite low in others. In states in which the numbers are large the need for expansion of facilities is brought to the attention of the public, and this gives an exaggerated picture of the increase in the country as a whole. At least that would appear to be true, if the comparative rates obtained for the 11 states included in this portion of the study are representative of the situation in the United States.

Perhaps the best way to explain the trends as seen in this study is to rearrange the data to show the effect of each of the main factors. (See Table IX.)

Differences between the figures of columns A and B represent the changes due to increase in births, while differences between columns B and C show changes in incidence rates by cause. These are summarized in Table X.

From these figures it will be seen that the net increase in the number of preschool blind children in 11 states was 58 per cent. Because the increase in births for the country as a whole was less, it is estimated that the increase for the United States was about 47 per cent.

The above figures are based on data from 11 states. Actually the trends shown in these averages are not typical of any state. The individual states differ widely, since each may be affected in varying degrees by the three factors mentioned. The only generalization that can be made is that the highest percentage increases between 1943 and 1950 occurred in the four states (New Jersey, Massachusetts, Washington and Maryland) which

TABLE IX

Comparison of Anticipated and Actual Number Pre-School Blind

Cause of Blindness	Number of Preschool Blind—11 States		
	As of 1943	As of 1950	
		Anticipated at 1943 rate	Actual at 1950 rate
	A	B	C
Retrolental fibroplasia	56	81	636
All other causes	778	1,116	681
Total—All Causes	834	1,197	1,317

TABLE X

Reasons for Changes Between 1943 and 1950

	11 States		Estimate for U. S.
	Number	Per cent of 1943 total	Per cent of 1943 total
Total preschool blind as of 1943	834	100	100
Changes between 1943 and 1950, due to			
Increase in birth rate	+363	+43	+33
Increase in incidence rate, retrolental fibroplasia	+555	+67	+62
Decrease in incidence rate, other causes	−435	−52	−48
Total preschool blind as of 1950	1,317	158	147

had very high increases due to retrolental fibroplasia.

Variations from state to state will be noted in the following examples. As in the table above, percentages given are based on the total cases in 1943.

New Jersey, which apparently had only 59 preschool blind children in 1943 had 213 in 1950, or an increase of 261 per cent—due to a 39 per cent increase in births, 120 per cent in retrolental fibroplasia and 102 per cent in other causes.

North Carolina, which started with 198 in 1943, had decreased to 98, or 50 per cent by 1950. It had a low increase in births (22 per cent), a very low increase due to retrolental fibroplasia (only 9 per cent) and these were more than offset by the 81 per cent *decrease* in other causes.

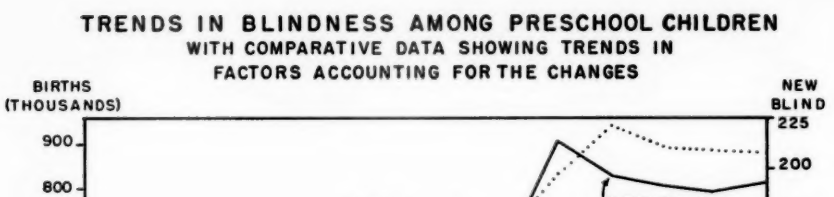
Massachusetts had 94 in 1943, a total increase of 174, or 185 per cent by 1950, due to 32 per cent increase in births, 135 per cent increase in retrolental fibroplasia and 18 per cent increase in other causes.

California started with 178 in 1943, had a net increase of only 72, or 40 per cent, because a high increase (80 per cent) due to births, and an average increase of 70 per cent due to retrolental fibroplasia were largely offset by 110 per cent *decrease* in other causes.

Maryland started with 55 in 1943, and had a net increase of 57, or 104 per cent by 1950, because a 40 per cent increase in births and 100 per cent increase due to retrolental fibroplasia were partly offset by 36 per cent *decrease* in other causes.

Illinois started with 168 in 1943 and had a net increase of 39, or 23 per cent by 1950—due to 30 per cent increase in births, 55 per cent increase due to retrolental fibroplasia and a *decrease* of 62 per cent in other causes.

The trend in blindness in children of preschool age is presented graphically on the next page. Based on 11 states, it shows the number of new cases occurring each year between 1937 and 1950 and the trend in number of births in these states over the same period. Here we note that the rate of increase in the number of blind from all causes appears about equal to the increase in births. The marked contrast between the upward trend in retrolental fibroplasia cases and the downward trend for other causes is also seen.



Summary

With the cooperation of many interested agencies in 22 states, the District of Columbia and the Territory of Hawaii, the National Society for the Prevention of Blindness made a study, based on ophthalmologic examination records of 2,800 blind children under 7 years of age as of 1950, in order to determine the rate and causes of blindness in this age group. Records already available from similar studies of the school-age blind were also used to show trends.

The average rate of blindness in 16 states supplying the most complete records was 24.6 per 100,000 population under 7 years of age. From this it could be estimated that the number of preschool blind was approximately 5,500 as of December 31, 1950 and may have risen to over 6,000 by the end of 1953.

Retrolental fibroplasia, an eye disease affecting chiefly tiny premature babies, was the cause of blindness in almost 50 per cent of the cases. Its cause is being studied in many research centers but has not yet been determined.

Blindness rates were found to be highest in states having a high prevalence of blindness due to retrolental fibroplasia.

Most of the blindness in preschool children occurred during fetal life or during the first year of life.

Comparative data for 1943 and 1950 indicates that there was an increase of about 50 per cent in the number of the preschool blind in the United States between these two years. This change was due chiefly to a marked increase in the incidence of retrolental fibroplasia, but also to the increase in the birth rate following World War II. Fortu-

nately the total effect of these two factors was largely offset by a net decrease in blindness due to other causes.

In states having a high rate of blindness due to retrolental fibroplasia the rate of increase between 1943 and 1950 was very much higher than the average.

Over 75 per cent of the blindness in this age group was reported as due to affections of the eye, the cause of which is not known. Extensive research is being carried on to discover the cause of retrolental fibroplasia. Similar investigation is needed to determine the factors responsible for other types of maldevelopment of the eyes; also intensive study of the hereditary factor and more effective use of this information.

As in the case of our previous studies of the school-age group, this study shows that substantial progress is being made in reducing blindness due to known causes. Our greatest need is for research into the causes and the means of preventing blindness in infants.

Pan-American Relations

Setting a new precedent for Pan-American cultural relations in ophthalmology, Drs. William B. Clark of New Orleans, Howard F. Hill of Waterville, Maine, and Paul Chandler of Boston, as a team, visited Cuba and Puerto Rico where, at the invitation of the local ophthalmological societies, the following program was given:

"The Selection and Preparation of the Patient for Cataract Extraction," by Dr. Clark; "The Incision and Closure," by Dr. Hill; "The Management of the Immediate and Postoperative Complications of Cataract Surgery," by Dr. Chandler. Round-table questions and answers followed.

DANIEL B. KIRBY, M.D.

Dr. Daniel B. Kirby, internationally known eye surgeon, died at his home in Pelham Manor, New York, on December 27, 1953. Noted for his development of new techniques in cataract surgery, Dr. Kirby made great contributions to teaching and research in ophthalmology, and was active in the Pan American Association of Ophthalmology. He served for many years as a valued member of the National Society's Committee on Glaucoma and helped in numerous important ways to advance the nationwide program for prevention of blindness. In his untimely death at the age of 62 his profession and the causes he served have sustained a great loss.

Glaucoma Clinic

The Glaucoma Clinic of the Manhattan Eye, Ear and Throat Hospital, founded in 1942 as a demonstration clinic in cooperation with the National Society for the Prevention of Blindness, has served a total of 782 patients. At the end of 1952, there were 292 attending the clinic regularly. During the 101 clinic sessions held in 1951 and 1952 over 2,700 patient-visits were made.

In the clinic's annual report for 1951–1952 the results of an investigation of the inheritance of glaucoma are given. About 15 per cent of the cases treated there are familial or inherited. Previously undetected cases are found much more frequently among relatives of glaucoma patients than in a survey of the general population. Twelve per cent of the relatives are found to have glaucoma, while only two per cent of the general population over age 40 have the disease.

A PARTIALLY SEEING CHILD LEARNS TO READ

FLORENCE CHRISTNER

Teacher of Sight Conservation
Oakland Public Schools, California

Limited vision need not prove a serious handicap to a child who has the capacity for making superior use of his abilities. He profits by instruction in the regular classroom if his educational program is fitted to his special needs.

THIS is the story of Jay and his reading development. When a child at the age of four years and 10 months, in his first term of kindergarten, is placed on sight conservation one may expect a high degree of visual impairment. Such is the case with Jay.

When work on his case was first begun under the Oakland plan of sight conservation the boy's general health and eye condition presented a rather discouraging picture. The latter was described as follows: albinism, tremor of both eyes, rotatory nystagmus, eyes not coordinated, minimal refractive error in both eyes, glasses of no help. A comment on the first medical report read: "Apparently a candidate for blind school sooner or later." Visual acuity was not recorded. In the general health history all findings were normal except that Jay suffered from frequent colds and asthma attacks, particularly through the winter months, with resultant irregular school attendance.

Other information gathered from the office of special education, from cumulative records at the school and conferences with the classroom teacher, the nurse and the child's mother included the fact that he lived in a comfortable home with his parents and a brother three years older. He liked to play active games with older boys, and also enjoyed playing alone. He went to Sunday school regularly and got stars for participation.

Jay talked very little to anyone. When he did speak some articulative defects were noted. He seemed to have a definite reluctance to express his interests and desires in language. At school he did not join in group games nor in sharing personal experience activities. He listened well to stories but made no language response. He was well liked by the children, who appeared to disregard his visual handicap. They said, "Jay can't talk much."

While Jay did not relate to his age group in work and play there were evidences of development in other ways. He made good use of his time; was happy carrying out individual projects; liked monitor duties; was

quick and efficient in distributing materials and in keeping toy and supply shelves in neat order. If someone usurped his assigned duties there was instant objection; he asserted his rights, but was not aggressive or inconsiderate. He liked toys, picture books of boats, trains and automobiles and worked well with his hands. Achievement in crayon drawing and easel painting was satisfactory. In clay modeling and construction with hammer and nails independence and initiative were displayed, and excellent use was made of his vision. He was outstanding in number concepts and dimensional relationships as indicated by test results and teacher observation.

There was a problem in relation to physical control. The boy found it difficult to sit quietly with feet on the floor, even for short periods. At times he crawled about the floor and under the tables. This inability to sit still may have been a matter of overactiveness, with health and visual implications, or just immaturity and a natural expression of a very active child. There was also the possibility that he could see better from a floor position.

Basic Principles of Instruction

Whatever the hindering factors may be, working cooperatively with the group, language development, and physical control for sitting quietly are three objectives of the kindergarten stage of reading readiness. The importance of the "complex factors of all-around development"[4] in the reading readiness program is the reason for this detailed account of Jay's home and school life. It is not that the eye condition and its effects on reading readiness are less important but that all other developmental factors are equally important. Armed with all available facts the sight conservation teacher is ready to assist the classroom teacher in developing a reading program suited to the over-all needs.

Some basic principles of reading instruction for the partially seeing child may be stated as follows:

1. Promote growth in reading in accordance with the modern concept of the role of reading in child development.
2. Provide a thorough developmental program at each level to prevent later reading difficulties and to insure maximum results from the allotted reading time.
3. Plan reading activities for each child on the basis of individual needs and the recommendation on the medical report.
4. Capitalize on the special abilities of each child, thereby directing attention away from his limitations.
5. Provide reading materials to meet the needs and visual limitations.
6. Foster the development of wholesome attitudes and learner purposes for reading.
7. Promote the growth of visual skills as a sight conservation measure.
8. Provide related activities which contribute to reading growth.
9. Foster the habit of extracting and using meaning from many learning experiences other than reading from books.
10. Develop thorough knowledge of best conditions for visual functioning; and good eye use habits for all visual tasks.

First Steps

Learning to read may be difficult for the partially seeing child under best conditions. Deficient perception

may hinder progress by delaying readiness for reading, the development of visual skills, and vocabulary growth. Rate and quality of development will show wide variations, as they do with the normally seeing child. An eye condition that severely limits the achievement of one child may not have the same handicapping effect on another with a similar defect. As Dr. French[2] says it: "Poor eyes backed by an alert and finely coordinated brain may perform wonders even in such matters as reading." This comment is well illustrated in the case of Jay.

During the first joint conference the classroom teacher presented Jay to the special teacher saying, "Here is a new friend for you, Jay. She will be coming to see you often." Jay smiled faintly but said nothing. He showed an interest in the book offered him. At a table by the window he looked at all the pictures carefully, nose-to-book. He then accepted the suggestion that he go into the library to hear the story.[5] When the noon bell rang Jay evinced willingness to hear the rest of the story the following week.

At the second conference during the noon hour of this same day it was arranged that the special teacher would give 30 minutes of individual instruction to Jay each week (time to be increased to 50 minutes next year). It was further decided that encouragement of language expression would receive particular attention during these periods. Jay's doctor would be consulted through the school nurse as to the advisability of the boy's viewing motion pictures and related visual material. No special materials were needed at this time except a reading stand. Proper control of light and other physical conditions would be arranged for the boy's comfort in the classroom.

Jay soon adjusted to working with the sight conservation teacher. By the end of the low kindergarten term a scrapbook of boats was completed, a project which grew out of the reading of "The Little Sailboat."[5] The child's cutting and pasting work was fairly neat. Since practice in picture reading is valuable the pictures were examined carefully and titles were decided on by him. This required much encouragement, but he was beginning to talk more. The titles were printed below each picture in India ink. One picture resulted in a two-sentence story. Jay could now match word cards and two sentence strips with the printed captions. He was very proud of his scrapbook and it was suggested that he show it to the class. He did not want to do this, but was willing to show it to his teacher and then put it on the reading table for the children to enjoy.

Another book used for individual instruction was "The Big Brown Bear."[6] Again picture reading was the approach and Jay was encouraged to tell his story from the pictures. After the story was read to him his ability to do critical thinking in response to reading became evident in his comments.

A few minutes each week were spent in working on speech. This was not done apart from the activities described above, but by informal practice in saying words that he could not speak plainly. Complete sentences were also stressed.

In the same informal way Jay was trained in the essential sight conservation habits. Easy-on-the-eyes habits for reading and all near-vision work received much attention throughout the primary grades.

Reading Readiness Objectives

The reading readiness activities employed have these purposes:

1. Encouragement of language expression; use of complete sentences; practice in correct articulation.
2. Stimulation of interest in reading and in making use of the ideas gained.
3. Encouragement of critical thinking during and after reading.
4. Practice in skills directly related to reading such as left to right progression, visual and auditory discrimination, and picture reading.
5. Provision of opportunities for sitting quietly while listening to stories.
6. Growth of vocabulary and interest in the meaning of words.
7. Stimulation of the desire to work with others.
8. Establishment of sight conservation habits.

The special teacher's aim at this stage is to reinforce and supplement the classroom teacher's work with the child so that learning to read will not be too difficult.

Work with Jay followed a similar pattern in the high-kindergarten and low-first grade terms. There were regular teacher conferences concerning his adjustment and progress in the group, and in activities of the individual instruction periods. Stories of school and home life were used to promote growth in peer relationships; much attention was given to personal experience stories. The child was encouraged to talk freely about his activities; this subject matter was transposed in over-size manuscript writing into simple stories and read many times. It was memory reading but he was learning the left to right sequence and how to focus.

Jay entered first grade in the spring term. He was absent the first week owing to a tonsillectomy, but this unfortunate beginning was equalized by a considerable improvement in general health, and attendance was increasingly regular. At the beginning of the third month Jay and his group were introduced to the reading readiness book of the basic series.[7] He was allowed to do this only after a careful checking of his visual comfort in using the book. It was decided to delay pre-primer reading until his second term of first grade in the fall.

In some ways Jay showed the necessary readiness for pre-primer reading. He was interested, and his reaction to story material was mature enough; experience background and vocabulary were adequate. It was anticipated that the visual defect would make the acquiring of a stock of sight words difficult even though Jay could discriminate between word forms. Quick, accurate word perception was necessary[8] so it was thought safer to continue the activities directly related to reading printed material for a longer time.

There were other reasons for waiting: the irregular attendance on entrance to first grade; the slow development in language and group cooperation; and inadequate physical control for sitting quietly. In a recent publication Anderson and Dearborn have this to say: "The advantage of waiting on growth is not that it will save us the trouble of teaching the child but that the learning process will be brought into play more easily and more readily."[9]

By the second month of high-first grade Jay was judged ready for pre-primer reading on the basis of informal

testing. Two pre-primers, a primer, and a first and a second grade text were enlarged. The handmade books were printed in manuscript with speedball pen and India ink; pictures from the regular text were pasted in. From book to book the manuscript print was gradually reduced in size as Jay's reading ability developed. It was hoped that he would be able to use the 24-point type commercially printed third grade reader at the proper time.

Growth of Skills

As skills develop and mature the length of time allowed for reading may be increased in ratio to the growing visual efficiency. Efficient eye movements reduce fatigue. Growth in visual skills is a matter of maturation[10] and good instruction in reading, rather than of training in visual skills specifically.[11, 12] Promoting their growth is an important aspect of the partially seeing child's reading program.

After Jay had read the two pre-primers and the primer of the basic series his vocabulary developed slowly. New words were added more rapidly at the first grade reading level and at this time the problem of sight word retention was noted. Comprehension was good in silent reading activities although the rate was slow in both oral and silent reading.

Because effort and interest were good and the use of picture and context clues excellent Jay was permitted to finish the first grade reader with his group—an average one. In order to allow Jay to absorb vocabulary at a slower pace he was placed with a small slow-progress group at the beginning of the fall term. He was now in high-second grade. The other children of the group read a pre-primer, a primer, and a first grade reader of another series while he read a handmade primer and a first grade reader of still another series. It was not possible to supply Jay with handmade books of the series the rest of the group were using. The basic second grade reader was then introduced to the entire group.

New Tools

Jay's vocabulary problems received regular attention in the individual instruction periods. Using the teacher's manual of the basic series, and after consulting Jay's classroom teacher, the special teacher selected activities that gave practice in the skills needed. Choice of reading activities was also made in relation to eye use time required. Jay continued to master a variety of contextual clues. He now needed the more accurate tools of phonetic and constructional analysis for deciphering unfamiliar words. This help was not given in isolation from meaning. Easy silent reading material was supplied and he was encouraged to make use of the new skills in combination with the old. Auditory and visual discrimination word games[13] gave additional practice when needed.

Typing, which will be introduced in the fall term, will be an aid to vocabulary growth in both writing and reading. Dictating words for typing practice presents an opportunity for reviewing phonetic elements, constructional analysis, and the spelling of familiar words.

Fortunately Jay enjoys rereading the books of the basic series. Up to now he has read a limited number of enlarged books of other series because of the close eye work required for other school subjects. Books selected to widen his reading interests are read to him in

the individual instruction time, and at home. His doctor allows him to watch television within limits but Jay is physically too active to want to watch it excessively. Viewing of motion pictures at school is permitted.

Further Progress

In mid-term of the past year Jay was given a double promotion from high-second grade to high-third grade. This school district has adopted the annual promotion policy and since Jay was enrolled in kindergarten at mid-term the question arose as to his grade placement. The promotion decision was made by reason of age, intelligence test results, high achievement in all areas except reading, excellent work habits, and social-personal development. It is evident that he has come a long way in his all-around educational development.

Jay is not considered a retardation case although his reading level was only high-second grade as he entered low-fourth grade last fall. Anderson and Dearborn[14] say that "it is perfectly normal for children to differ in the time at which they learn to read. . . . They will learn as they gain maturity provided that an adequate amount of nurture is supplied." It is expected that the boy's reading progress will be greatly accelerated next year. He has recently shown a fair degree of growth in visual efficiency—that is, in eye span and eye movements. His interest and effort, comprehension and use of reading skills are good. The most recent medical report gives further reason for this optimism: "Eye condition no change (20/300 in each eye), no further deterioration expected; little improvement in visual acuity with glasses but he is more comfortable wearing them; no limitation on amount of eye use necessary; to be allowed to use his eyes as any normal child."

Jay's general health is good and accordingly his attendance record the past year was excellent. He has been receiving instruction in speech correction for one year and is showing improvement in this area. There is need for further development in oral participation in group work, but there is definite improvement in speaking vocabulary and use of language. He is conforming satisfactorily to group requirements for physical control in the classroom. But whether Jay's progress in reading is slow or rapid, next year he should be allowed to advance at the rate which is comfortable for him.

Looking Ahead

From now on Jay will have ever-widening uses for reading. In the subject fields he will need to learn a variety of ways of reading for meaning. In order to conserve eye use time he will need guidance in developing efficient study habits. A wider variety of enlarged reading materials must be supplied. He will need guidance in making use of many learning aids other than reading from books. From now on the sight conservation teacher has a larger responsibility in assisting the classroom teacher to develop a program that fits Jay's particular needs. With his capacity for making superior use of his abilities and his limited vision, Jay's future growth in and through reading is promising indeed.

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Next Year's NSPB Conference
March 16, 17, 18, 1955
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PROGRESS OF CHILDREN WITH VISUAL PROBLEMS

THE October, 1953, issue of *Engineering Experiment Station News*, published by the Ohio State University, contains a report on "School Activities and Vision," by Dr. Wilda M. Rosebrook, associate professor, bureau of special and adult education, Ohio State University.

The study was initiated in 1945 in a suburban school in metropolitan Columbus, Ohio, and was designed to test the hypothesis that children with visual problems are not able to make progress through the elementary school in keeping with their ability.

A total of 74 elementary school children were included in the study: 22 in the experimental group and 52 in the control group. Criteria for selection included records of vision screening tests, results on group intelligence tests at third and sixth grades, and results on group achievement tests at third, fourth, fifth, and sixth grade levels.

Results of the long-range study are summarized as follows:

1. Children having visual problems made progress through the elementary school grades in keeping with their ability. Thus, the hypothesis being tested was rejected.

2. The children in both the experimental and control groups tended to have intellectual ability within good average limits.

3. The results on the achievement tests for both groups were satisfactory and consistent with their intellectual ability.

4. Subjective evaluations of the social and emotional adjustment of the children with visual problems indi-

cated that they tended to be quiet, conforming, and withdrawn.

5. An objective evaluation of the behavior of the experimental and control groups was made during the spring of the 1952–53 school year; the children's classroom teachers in Grades 7, 8, and 9 rated the children on the Haggerty-Olson-Wickman Behavior Rating Schedules. The findings indicated that children having visual problems manifest behavior not significantly different from their peers except in social adjustment.

Findings from this study warrant advancing the hypothesis that children having visual problems manifest behavior significantly different from that of their peers in social adjustment.

Examinations for Children

During the school year 1952–1953, a total of 107,181 Philadelphia school children were given complete medical examinations as a result of the School Health Act passed in 1945. Under this act, each pupil must have such an examination every two years. Last year 105,346 children were examined by school medical examiners, and 1,835 by private physicians. An increased percentage of pupils (47.7 per cent) were found to be normal.

Treatment was recommended for 75,360 defects excluding dental work, and 34,334 were treated. The most frequent remediable defects found were dental caries (74.9 per cent), orthopedic defects (12.1 per cent), underweight (7.2 per cent), defective vision (10.6 per cent), overweight (10.2 per cent), and diseased tonsils (7.2 per cent).

Ocular defects were reported to parents with the recommendation that the child be examined by a private eye doctor or at an eye clinic maintained by the division of medical services of the Board of Education. The school medical examiners found 11,324 pupils to have defective vision during the 1952–1953 school year. Of these, 3,228 were referred to the Board of Education clinics. Corrective lenses were given to 2,401 pupils. Two hundred eighteen pupils with medical or surgical problems were referred to hospital agencies for diagnostic study. Private ophthalmologists examined 2,440 pupils and private optometrists examined 2,570.

Thirty-three pupils with irremediable eye defects and low visual acuity were admitted to classes for special education. In June 1953 a total of 167 pupils was registered in these classes.

Summer Courses

The National Society has received word from the following colleges and universities that they will offer during the coming summer session the complete course recommended by the National Society for teachers and supervisors of the partially seeing. Detailed information may be obtained by writing to the individuals indicated:

Illinois State Normal University, Normal, Illinois. Date: June 21–August 13. Miss Elizabeth A. Hughes, Special Education Laboratory School.

San Francisco State College, San Francisco, California. Date not yet announced. Mrs. Florence G. Henderson, Assistant Professor of Education.

Syracuse University, Syracuse, New York. Date: June 28–August 6. Dr. William M. Cruickshank, Director, Division of the Summer Session, School of Education.

Wayne University, Detroit, Michigan. Date: June 27–August 6. Dr. John W. Tenny, Gen. Adviser, Spec. Education.

NOTES AND COMMENT

• Age and Night Vision

The 55-year-old man who is proud of his 20/20 vision actually requires twice as much light as a teen-ager with the same 20/20 eyesight to distinguish objects at night. An American Automobile Association warning to motorists in a recent *New York Times* article stated that night vision decreases with age, and resistance to glare after dark becomes progressively poorer. Beginning at about the age of 45, says the AAA, these changes take place rapidly and are appreciable. Hazards of night driving, therefore, become greater as motorists grow older.

The best remedy for the situation is to warn older motorists of the added hazards of night driving resulting from restricted vision. Motorists are also cautioned to beware of the "invisible man," the pedestrian who wears dark clothes and is almost impossible to see on a dark, rainy or foggy night. Last year one out of six fatal pedestrian accidents occurred in rainy, snowy or foggy weather.

• Award to Dr. Benedict

Dr. William L. Benedict recently received the Beverly Myers Nelson Achievement Award of the Educational Foundation of the American Board of Opticianry. The citation, made annually for "meritorious contributions or outstanding services to the field of optics as applied to vision," read: "Internationally known savant in Ophthalmology; Professor, Mayo Foundation, University of Minnesota; ardent supporter of education and research in vision and optics; inspired leader in his chosen field."

Dr. Benedict, a member of NSPB's board of directors and chairman of the Society's committee on research, is author of about 100 research articles in ophthalmology and is widely known for his surgical techniques and procedures, particularly of orbital tumors.

• Eyes, Light and Paint

Three important factors affect seeing in an industrial plant: eyes, light, and paint. Paul Hildebrand, lighting director of the Pennsylvania Power and Light Company, Allentown, Pennsylvania, stated in a recent *Better Light Better Sight News* article that lighting is only partially utilized if dark and dirty ceilings, walls, floors, and machinery absorb a high proportion of the illumination. Good lighting plus good painting are not enough, however; tests have shown that a large percentage of our industrial workers need to have their vision corrected, and many would work more efficiently from a visual standpoint if they were transferred to other jobs.

In addition to the optimum quantity of light for an industrial task, Mr. Hildebrand said, the best quality should be provided. Glare, both direct and reflected, dark shadows, and excessive contrast should be eliminated.

Lamps and fixtures must be kept clean and lamps should be replaced periodically to maintain the desired illumination level. Light walls, ceilings, furniture, and machinery provide for maximal utilization of illumination by reflecting light. Such surroundings are created by painting and maintained by cleaning and repainting.

• Community Effort

"I would suggest you must live, think, and talk prevention of blindness. To do this you must know your territory from top to bottom, not only from the eye standpoint but from every other." These are the words of Dr. Jay G. Linn, Sr., in answer to the question "What can the professional workers . . . do to prevent unnecessary blindness in their own communities?"

In a paper given at the October 1953 Inter-Branch Conference of the Pennsylvania Association for the Blind, and published in *The Seer*, December 1953, Dr. Linn charged prevention of blindness workers with the responsibility of knowing doctors, nurses, dentists, pharmacists, optometrists and opticians—in short everyone in the community connected with medicine. They should also know the local service clubs and churches, and become leaders in all programs to advance the community standards. Prevention of blindness must be viewed in its relation to problems of neighboring counties, states, on a national level, and even internationally.

Dr. Linn went on to urge that "all of us . . . read up on Genetics or the science of inheritance, especially as it refers to our line of work." He proposes two methods of halting genetically determined blindness—one by continence and the other by sterilization. Neither method is possible without talking and explaining so that people will understand the motives and results of eugenic control.

One of the most constructive endeavors in prevention of blindness work is the mobile eye clinic sponsored by the Pennsylvania Association for the Blind and the Pennsylvania Council for the Blind, which in its first two weeks in one county uncovered two glaucoma cases, ten cataracts, four cases of chorioretinal disease, eight squints, and saw a total of 115 cases. If all of these potential blind persons can be taken off the list, said Dr. Linn, the mobile eye clinic has paid for itself many times over in two weeks.

• Anoxia Symposium

The Council for International Organizations of Medical Sciences organized a Symposium on Anoxia of the New-Born Infant, made up of 17 outstanding authorities in the fields of obstetrics, pediatrics, pathology, anatomy, physiology and chemistry. The proceedings, which took place over a period of five days, were published in 1953 in book form under the title *Anoxia of the New-Born Infant* by the Blackwell Scientific Publications, Oxford, England.

In view of the present indictment of oxygen as a cause of retrolental fibroplasia, the section on the place of oxygen in the therapy of premature infants is of particular interest to ophthalmologists, pediatricians and prevention of blindness workers in general. Anaerobic metabolism, arterial oxygen saturation, oxygen therapy and treatment of respiratory difficulties in premature infants are discussed.

CONFERENCE CALENDAR

President's Safety Conference—Means of reducing the annual toll of 1,450,000 disabling injuries including 8,800 deaths in construction, manufacturing, public utilities, trade, finance, service, and government, will be considered at the President's Conference on Occupational Safety, scheduled for May 4, 5 and 6, 1954 in Washington, D. C. President Eisenhower will open the conference which will bring together some 1,000 of the nation's top leaders of business, labor, insurance, education, state and federal agencies, and private safety organizations.

Conference committees composed of about 500 safety technicians from all parts of the country will meet on the day preceding the main conference.

International Congress—The XVII International Congress of Ophthalmology will meet in Montreal, Canada September 9 to 11, 1954, and will reconvene in New York September 12 to 17. Persons who wish to present papers, films or exhibits at the congress should contact Dr. William L. Benedict, secretary-general of the congress, 100 First Avenue Building, Rochester, Minnesota.

Tentatively the program will include a session devoted to primary glaucoma on Wednesday, September 15; a session on the etiology of uveitis on Thursday, September 16; and on Friday, September 17, there will be an open meeting of the International Association for Prevention of Blindness, dealing with sociological studies and eye conditions causing blindness.

College Health Conference—NSPB is among 40 national organizations interested in health and education sponsoring the Fourth National Conference on Health in Colleges, to be held May 5–8, 1954 at the Hotel Statler, New York. Previous conferences were held in 1931, 1936 and 1947.

Comprehensive and integrated programs of health service and education for protecting and improving the health of college students, and formulation of suggestions to relate health programs to other college programs will be considered at the conference.

FUNDS FOR EYE RESEARCH PER 1,000 POPULATION

Census Divisions	1952 Research Funds	1952 Census Estimates	Dollars per 1,000 Population
New England	$216,277	9,509,000	$22.74
Mid-Atlantic	270,942	30,949,000	8.75
South Atlantic	127,900	22,073,000	5.79
North Central	362,519	45,802,000	7.92
South Central	133,096	26,543,000	5.01
Mountain and Pacific	96,562	20,890,000	4.62
Federal and national agency research	371,580	..	..
	$1,578,876	155,766,000	$10.14

CORRECTION—An error occurred in the last column of this table which appeared in the article on "Growth of Eye Research" on page 226 of the Winter 1953 Issue of the REVIEW. The figures as given above are correct.

AROUND THE WORLD

AUSTRALIA

Vision Tests for Drivers—All West Australian motorists who wear glasses when driving must have their licenses reviewed at the end of 12 months. At that time reapplication involving another vision test must be made.

Unrestricted licenses are given to applicants who read 6/12 through each eye without glasses on the Snellen chart, or applicants with vision in only one eye who can read 6/6. The license is subject to certification by the district medical officer that the visual field is adequate. Police action is taken against motorists with special licenses who drive without their glasses, and fines are imposed.

BRAZIL

Ophthalmological Congresses—São Paulo will be host to five ophthalmological congresses, four of them international and one Brazilian, from June 9 to 17, 1954. The congresses, meeting concurrently, are the III Pan American Interim Congress of Ophthalmology; the Pan American Congress for the Welfare of the Blind; the II Congress of the South American Meridional Ophthalmological Society; VIII Brazilian Congress of Ophthalmology; and International Congress of Oto-Neuro-Ophthalmology. Registration in one congress implies the right to take part in all the scientific and social activities of the other meetings.

The official subjects for the Pan American Interim Congress of Ophthalmology will be "Recent Advances in Ocular Therapeutics" and "Prevention of Blindness." The VIII Brazilian Congress of Ophthalmology will have as its official subjects "Uveitis" and "Keratoplasty."

For information regarding the congresses, interested persons should communicate with Professor Maocyr E. Alvaro, 1151 Consolação, São Paulo, Brazil. The telegraphic address is "Ophthalmos."

EGYPT

Fly Control—Since the isolation in 1888 of gonococci from the proboscis of flies and the statement of its relation to acute ophthalmia in Egypt, it has been observed that regularly recurring epidemics of gonococcal ophthalmia and Koch-Weeks infections coincide closely with the fly-breeding seasons. Both conditions require a warm environment, but the gonococcus requires in addition high humidity. Drs. F. M. Lyons and G. E. Abdine reported in the *Bulletin of the Ophthalmological Society of Egypt, 1952 Session*, that epidemics of both diseases occur in spring and autumn. The gonococcal epidemic in autumn is always more severe than in spring, since it coincides with the rising of the Nile and a relative humidity of 70 per cent or more.

Since the gonococcus organisms tend to disappear at the end of the acute

stage of untreated gonococcal ophthalmia, carriers between epidemics are relatively few, the doctors stated. In Koch-Weeks ophthalmia, however, the organisms persist in the conjunctival sac for weeks or months after the acute stage of the infection subsides, and carriers are numerous at all times. Collective chemotherapy of the child population at the beginning of the epidemic season can so greatly reduce the carriers of both organisms that the seasonal rise in acute ophthalmia can be largely prevented despite favorable climatic conditions. The incidence of acute gonococcal and Koch-Weeks ophthalmia was greatly diminished in villages where fly control was adopted as compared with nearby villages in which no such measures were taken. It is almost certain, therefore, that flies spread eye infections.

ENGLAND

Quackery—Far from being a refinement of modern medicine, quackery has been known in Britain for nearly 2,000 years. At that time a quack doctor named Junianus announced to the people of Bath that he had an eye salve which he claimed to be the medicine of Phoebus Apollo. An article by Aytoun Ellis in the British magazine *Courier*, in which the most prominent quacks of times gone by are discussed, states that, "medicine is far more reliable an art these days, but its practitioners are less colourful."

William Read, a quack eye specialist who started life as a tailor, became Oculist-in-Ordinary to Queen Anne and was ultimately knighted. He went to London and gained the Queen's favor after having secured testimonials from a bishop, a provost, and an eminent physician in Dublin.

FRANCE

Child Blindness in Brittany—Dr. G. P. Sourdille, Dr. I. Stenkovic, and Dr. G. Marsac, in a recent report before the Société d'Ophtalmologie de Paris, presented the results of examinations of 60 blind children in Brittany. The ages of the patients at the time of examination varied from six to 22 years, the majority being between 10 and 16 years old. Blindness had begun at birth in 29 cases, before two years of age in 12, between two and four years in six, between five and 10 in eight, and after 10 years of age in 3. Thus, in 70 per cent of these patients the onset of blindness was prior to the age of two years.

The following conditions with a possible hereditary relation to the blindness of these patients were present in their families: consanguinity in four cases, blindness in three, deaf-mutism in one, and alcoholism in 12.

Glaucoma was given as the cause of blindness in 14 cases; tapeto-retinal degeneration in 11; congenital cataract in seven; ophthalmia neonatorum in five; optic nerve atrophy in five (three after meningitis, one syphilitic, and one of unknown origin); trauma from globe injuries in four; sympathetic ophthalmia, complicated infectious keratitis, and unknown causes in three each; metastatic ophthalmia and congenital malformations in two each; interstitial keratitis in one case.

Detached Retina and Vitamin A—The role of vitamin A deficiency in predisposing toward retinal detachment is the subject of studies by Dr. F. C. Paycha, reported in *Archives d'Ophtalmologie et Revue Générale d'Ophtalmologie*. The theory that vitamin A deficiency may be involved is in har-

mony with the already known facts: retinal detachment patients have degenerative lesions which could be due to avitaminosis; decreased acuity in darkness has been noted, persisting after surgical reattachment of the retina. The night-blindness and frequent bilaterality of retinal detachments indicate a systemic cause outside of the eye. This is likely to be a deficiency capable of reducing vision in dim light. The above symptoms are lessened after vitamin A injections. The detachments often begin in the spring, a period of relative vitamin A deficiency.

Dr. Paycha concluded that a concomitant relationship exists between retinal detachment and lack of vitamin A. This lack is not sufficient in itself to cause detachment of the retina, but it predisposes toward detachment. The proposed role of vitamin A helps to explain why some myopes will suffer retinal detachment on the least provocation, while others escape in spite of severe trauma.

KOREA

Ocular Casualties—Speedy and nontraumatic evacuation of eye casualties by helicopter enabled wounded men to receive excellent care. The jostling of ocular patients in an ambulance over rough Korean roads often would be disastrous to vision. Evacuation of battle casualties to a division hospital where definitive therapy could be given was usually accomplished within 30 minutes after the wound was reported. If the field hospital's facilities were inadequate, the patient was flown by helicopter to a well-equipped hospital ship. Dr. S. Lawrence Jukofsky, Lieut. M.C., U.S.N.R., described the organization and experience of the ophthalmology department of a marine medical battalion in Korea in a recent *American Journal of Ophthalmology* article.

The division hospital's eye clinic, a large room in a one-story metal covered building, was equipped to perform refractions and to issue glasses within seven days. Elective surgical procedures for pterygia, strabismus, and lid plastic surgery were not done in Korea. Intraocular foreign bodies, if deeply imbedded, were removed at the hospital ship. Many eyes were so damaged that enucleation had to be performed. Such patients were sent to the ship for postoperative care and then evacuated to Japan.

Mild conjunctivitis, usually accompanied by blepharitis, was common after the onset of cold weather, and responded well to treatment with 10 per cent sodium sulfadiazine and local heat.

Foreign bodies were removed from the cornea with a spud under local pontocaine anesthesia when possible. Glaucoma was noted only secondary to injury. Angioneurotic edema, the most prevalent allergic ocular condition, responded well to antihistamine drugs. Very few cases of methyl alcohol poisoning have occurred.

PUERTO RICO

Eye Accidents—The eyes were the third most frequent body part injured by accidents in agriculture in Puerto Rico during 1952–1953, according to figures published in *Boletín de Prevención de Accidentes* of January 1954. Fingers were injured in 7,367 cases, legs in 5,606, and eyes in 3,865 accidents. The total number of accidents in agriculture during that period was 27,154; of these, 14.2 per cent resulted in eye injuries.

SPAIN

Trachoma Battle—Trachoma is prevalent in approximately half of Spain, including the Mediterranean and Atlantic coasts and the meridional zone. It is most frequent and of greatest severity on the coasts. In Spain, as in other countries, trachoma occurs most often in the poorest classes of society living under the worst hygienic conditions.

The history of the campaign to eradicate trachoma in Spain is given in an article by Dr. M. Marín-Amat which appeared in the *Boletim da Liga Portuguesa de Profilaxia da Cegueira*. In 1919 the national government included trachoma among infectious diseases and made its registration mandatory. The "Lucha Antitracomatosa Oficial" (official battle against trachoma) was created in 1927. At the present time 52 provincial and 53 district ophthalmic services are functioning, and 72 antitrachoma dispensaries. The numerous personnel charged with the antitrachoma fight are scrupulously selected among ophthalmologists by means of competitive examinations. The program is conducted exclusively at the expense of the government.

WORLD HEALTH ORGANIZATION

Attack on Blinding Disease—Onchocerciasis, resulting from infection with threadlike worms called *Oncocerca volvulus*, transmitted to man by certain species of flies, affects 19 million people in Africa and nearly a million in America. The three main features of the infection are small tumors on various parts of the body, skin rash, and eye lesions often leading to blindness through a slow process which may extend over a period of seven to eight years. In some districts 80 to 100 per cent of the population are infected and in certain localities one to five per cent of the people become blind as a result of onchocerciasis. It is widespread in Africa and more localized in the Americas. For a long time it was thought to be present in America only on the Pacific slopes of the Sierra Madre range in Guatemala, and in some districts of southwestern Mexico. However, another endemic area has been detected recently in Venezuela and some cases have been reported from Surinam.

Two possible attacks may lead to the control of the disease, which has baffled public health workers for fifty years. Two new groups of drugs have shown activity in killing the adult worms and their young; and control of the vector transmitting the disease may be accomplished through insecticides.

An expert committee of the World Health Organization discussed the control of onchocerciasis at a meeting held in Mexico City from November 23 to December 1, 1953. The committee's task is to assess methods of control and to submit recommendations.

VD Problem

A joint statement on the status of venereal disease control and future needs was made by the American Venereal Disease Association, the Association of State and Territorial Health Officers, and the American Social Hygiene Association. One concern of these agencies is the cost of maintaining the syphilitic blind, about $12,500,000 annually. Federal funds for VD control show a decrease of 76 per cent from $9,850,000 in 1953 to $2,300,000 proposed for 1955, while the VD rate has risen in 1953 in 17 states.

CURRENT ARTICLES

Experimental Hydrosulphosol Therapy of Thermal and Chemical Ocular Burns in Rabbits. W. H. Havener, H. F. Falls, and H. B. McGee. *The Eye, Ear, Nose and Throat Monthly.* Vol. 32. pp. 201–202. April 1953.

Although hydrosulphosol was advanced as a therapeutic aid in the healing of ocular burns, recent studies of the healing properties of this substance indicate that it may actually retard, and certainly does not promote wound healing. Moreover, it is indicated that the use of hydrosulphosol may present a hazard since it enhances anaerobic bacterial growth.

The author produced thermal or chemical corneal burns in both eyes of ten rabbits. Hydrosulphosol was instilled daily into the right eye, and castor oil into the left. No significant differences were observed between the control and hydrosulphosol-treated eyes in the course of healing or the severity of complications.

The Phenomenon of Accident Proneness. A. G. Arbous and J. E. Kerrich. *Industrial Medicine and Surgery.* Vol. 22. pp. 141–148. April 1953.

In the accident reduction program of the Cleveland Railways Company the clinical approach, or individual evaluation, is used to determine accident proneness and its cause within the individual. The primary causes of accident proneness among 50 men were determined; in no two cases were they exactly alike. Defective vision caused accident proneness in four per cent of these individuals; faulty judgment of speed and distance was responsible in 12 per cent.

An Analysis of Four Visual Screening Tests at Grades Four and Seven. H. M. Robinson. *American Journal of Optometry and Archives of the American Academy of Optometry.* Vol. 30. pp. 177–187. April 1953.

The Keystone Visual Survey Test, the Massachusetts Vision Test, the Eames Eye Test, and the Ortho-Rater were evaluated. Fifty-three pupils in Grade IV and 52 in Grade VII were tested. Approximately four and a half hours of testing time per pupil were required and 28 scores were recorded for each child.

Visual acuity and lateral phoria tests at 20 feet are included in all the batteries; vertical phoria at far distance and lateral phoria at near distance are in three batteries; visual acuity at near distance, depth, and color are included in two batteries; fusion targets are considered in but one screening test.

The results of the analysis reveal that standards for passing and failing individual items and the complete test are most accurate in the Ortho-Rater, Massachusetts, and Keystone batteries. Further study is required to determine the reliability of the tests and the relationship between achievement on the tests and in school work.

Evaluation of Plastic Spectacle Lenses. A. H. Keeney and H. L. Duerson. *A. M. A. Archives of Ophthalmology.* Vol. 49. pp. 530–535. May 1953.

Plastic lenses offer the following advantages over glass: (1) impact resistance of some plastics is greater than case-hardened glass; (2) fragmentation usually produces larger, more obtuse segments than occur with broken glass; (3) the weight is 40 to 50 per cent that of glass; (4) light transmission is five to eight per cent better than glass; (5) the tendency to fog is reduced 60 to 75 per cent; (6) high-velocity particles and welders' splatter affect plastic less than glass; (7) fewer rings are apparent in strong minus lenses; (8) surfacing procedures are eliminated since plastics can be produced by molding or casting.

Residual Accommodation under Homatropine-Cocaine Cycloplegia. P. M. Brickley and K. N. Ogle. *American Journal of Ophthalmology.* Vol. 36. pp. 649–660. May 1953.

Residual accommodation after cycloplegia has been reported repeatedly, ranging between 0.55 diopter and 1.66 diopters. These reports are based on data obtained for blur points. Since the earlier investigators did not differentiate between the range between blur points and the range of accommodation, the present authors felt such studies were inconclusive.

Investigation was undertaken of the eyes of 100 subjects between ages 13 and 38 under cycloplegia induced by gelatin wafers of homatropine and cocaine. Residual accommodation was measured both by the oculometer and the blur point method. When a completely relaxed eye views a distant object, the theoretical conjugate point to the retina is infinity; however, the oculometer shows that the conjugate point is on the average 0.5 diopter inside of infinity (myopic). The mean oculometric setting of the 100 subjects (200 eyes) for distant vision was 0.521 diopter, and 0.564 for near, with a mean difference of settings of 0.043 diopter. This difference is substantially zero. Thus, according to oculometric data, no residual accommodation remained after cycloplegia.

The same 100 subjects were then tested for blur points with a +2.50 diopters lens placed in front of the eye. The mean near blur point was 3.722 diopters, and the mean far blur point was 2.302 diopters; the mean mid-point between blur points was 3.012. When corrected for the +2.50 diopters lens, the blur points were 1.222 diopters for near distance and −0.198 diopter for far distance, with a mid-point of 0.512. This last figure can be taken to be residual accommodation after cycloplegia, and can be accounted for by oculometric data which show that the conjugate point to the retina is 0.5 diopter proximal to infinity. Thus, the blur point technique, too, shows no residual accommodation after cycloplegia.

It is important that the clinician be aware that dioptric results obtained by the blur point technique do not represent residual accommodation, but rather, are due to the following three factors:

1. The conjugate point to the retina is 0.5 diopter proximal to infinity.
2. The depth of focus influences the dioptric value of the near blur point or the range between blur points.
3. The sense of blurring is less critical when letters are recognizable than when they are unrecognizable.

Experimental Study of Plastic Material as Replacement for the Cornea. A Preliminary Report. W. Stone, Jr. and E. Herbert. *American Journal of Ophthalmology*. Vol. 36. pp. 168–173. June 1953.

Since living-donor corneal transplantation often fails due to clouding of the donor graft and ingrowth of vessels, an attempt was made to develop a plastic graft which could not cloud and into which vessels could not grow. Full-thickness plastic grafts placed in 15 rabbits in 1947 were extruded in 14 days. In 1951, interlamellar plastic disc implants were placed in rabbit corneas, and have been well tolerated to date with the exception of two discs which were extruded after 19 months. An incompletely covered interlamellar disc remained in place and was well tolerated until the death of the rabbit 12 months later. In view of the two extrusions of implants, human experimentation is not justified at this time; the monkey has been selected for future experiments.

This study was supported in part by a research grant from the National Society for the Prevention of Blindness.

Whole Body Irradiation of Large Animals. Lt. Col. B. F. Trum. *The Military Surgeon*. Vol. 112. pp. 333–341. May 1953.

Radiation syndrome, the symptom complex following whole body radiation of penetrating ionizing particles or photons, may result from sources including an atom bomb explosion, a chain reacting pile, a decaying radioisotope, an X-ray tube, or devices such as the cyclotron and betatron. Transitory or permanent injuries are sustained when cells absorb radiation, their extent being proportional to the density of ionization along the track of the particle. The dose, rate of dose, and quality of radiation influence the responses. Instantaneous death has not been reported in larger animals. The lethal dose of radiations and survival time after lethal doses vary with the species. The effects of radiation were observed in 150 burros.

Several manifested severe conjunctivitis accompanied by copious tears and edematous conjunctiva between the second and seventh days and the fourteenth and eighteenth days after irradiation. Spontaneous recovery followed a few days later; ectropion occurred in three animals on the second and third days. The incidence of keratitis increased, along with small pitting corneal ulcers. Occasionally a diffused nebula was observed two to five days after irradiation. Two burros developed a dense partial leukoma on the lower two-thirds of both corneae during the sixth week after tantalum-182 radiation; these animals became partially blind and ultimately died. Two had vascularization of the cornea during the third week. Hemorrhages were observed around vessels in the fundus only after hemorrhages occurred in other parts of the body. One year after exposure two out of forty survivors developed cataracts; however, they were of a type not associated with radiation injury.

Large doses of X- or gamma radiation are required to produce cataracts or keratitis. In the mouse, X-rays and slow neutrons readily induce lens opacities. Microscopic examination of the eyes of pigs and goats exposed to the Bikini atom bomb or to X-ray, which had received lethal doses, reveal no changes from direct radiation alone.

Excessive Intake of Vitamin A as a Cause of Congenital Anomalies in the Rat. S. Q. Cohlan. *Science.* Vol. 117. p. 535. May 15, 1953.

The results of preliminary experiments indicate that when excessive amounts of vitamin A are administered to pregnant rats the litter rate is markedly reduced and the surviving young have congenital defects. Of 100 mated female Wistar rats fed 35,000 International Units of vitamin A daily for 13 to 15 days, only ten carried their litters to term; 74 offspring were produced. Thirty-four of these offspring, or 54 per cent, exhibited a gross anomaly in skull and brain development, the brain, thinly covered with a membrane, being extruded to the external surface of the head. Sporadic anomalies noted were macroglossia, harelip, cleft palate, and gross defects in eye development. A control group of 50 mated females produced 44 litters, with a total of 410 normal offspring. Earlier studies by other investigators indicated that maternal deficiencies of vitamin A also produce defective offspring.

Diagnosis and Treatment in Ocular Allergy. S. A. Hanser. *Transactions, American Academy of Ophthalmology and Otolaryngology.* Vol. 57. p. 476. May–June 1953.

Most patients with ocular allergy exhibit signs associated with a general allergic tendency, such as slow pulse, low blood pressure, spastic gastrointestinal tract, increased blood eosinophilia, and lowered basal metabolism rate. In testing for ocular allergies, one may utilize case histories, provocative tests, conjunctival tests, patch tests, skin tests, and injection tests.

Provocative tests with a suspected antigenic material offer considerable possibilities in diagnosing ocular allergy, but their dangers and pitfalls must be kept in mind. Considerable safety for the patient is afforded by administering antigen on the conjunctiva of the lower lid. Marked changes may thus be produced, and if excessive, the unexpended balance of antigen may be flushed out. Patch tests, in which the suspected antigen is maintained in contact with unbroken skin around the lids for one to four days, are reliable. However, too much antigen may cause sensitization of the patient, who might otherwise not become sensitive to that particular substance, and infection may result if irritating, gritty, or contaminated antigens are employed. Although skin tests are of diagnostic importance, their interpretation and evaluation must distinguish between false reactions and those which are definite or specific.

The conjunctival scrape smear is of value in determining eosinophils and the proportion and distribution of other cell types in the conjunctiva. In individuals with an infectious condition, polymorphonuclear cells frequently increase, and if the fluctuation of these cells parallels that of the eosinophils, then the allergy may be of a bacterial nature.

Cortisone given systemically or locally as drops causes a greater drop in eosinophils and results in greater subjective improvement than other therapeutic agents. Hypodermically administered staphylococcus toxoid is the next most effective agent in causing a drop in eosinophil count on conjunctival scrape smears. In infected cases cortisone should not be used, as it may act as a spreading factor. It

should be employed only when a definite allergic factor is present.

In nongranulomatous uveitis, diagnostic anterior chamber punctures are used to determine total protein, cell counts, bacterial culture, and cell distribution. When the anterior chamber eosinophil count is four per cent or more, cortisone is of therapeutic value.

The Cross-Eyed Child; Etiologic Factors in His Defect. G. M. Haik and G. Ellis. *Journal of the Louisiana State Medical Society.* Vol. 105. pp. 191–194. May 1953.

Two mechanisms control binocular vision, fixation, and fusion: the extraocular muscles for eye movement and the sensory psychic visual apparatus for forming retinal images, transmission to the brain, and fusion of bilateral images to a single image. Interruption of the process of visual development may occur at any age, resulting first in decreased vision in one or both eyes, and later in strabismus. Pseudostrabismus may result from wide epicanthi or epicanthosis. True strabismus is generally caused by muscle dysfunction. However, brain tumor, retrobulbar tumor, and retinoblastoma may be associated with crossed eyes, which may be the first sign of these diseases. Crossing of the eyes is a late manifestation in retrolental fibroplasia, and it is sometimes the first sign of congenital cataract. Strabismus fixus is a type of congenital anomaly. If fusion is subnormal, strabismus may result from unequal errors of refraction. Any monocular blindness will cause turning of the blinded eye if a latent muscle imbalance is present.

Muscular dysfunctions are attributable to a variety of factors: congenital weakness of the muscles; hereditary strabismus; loss of muscle tone from general disability; childhood diseases such as measles, influenza, and mumps, in which there is latent weakness prior to disease, and diphtheria which affects the eye muscle directly; trauma during delivery. Strabismus may result from one or more causes.

The form that therapy of strabismus takes is determined by its causes. Parents of cross-eyed children must be made aware that the problem is one of visual function rather than merely cosmetic, and that spontaneous cure is not to be expected. If treatment is delayed irreversible anatomic changes may take place and subsequent therapy may be futile. Although not all crossed eyes require surgery, nonsurgical therapy is applicable only in selected cases. The surgical procedure depends on the etiologic factors responsible for the strabismus. The goals of therapy are to eliminate potentially serious conditions, to avoid psychic disturbances, and to establish stable binocular vision.

Albinism. H. F. Falls. *Transactions, American Academy of Ophthalmology and Otolaryngology.* Vol. 57. p. 324. May–June 1953.

Any break in the chain of metabolic reactions leading to the production of melanin pigments will result in albinism. These reactions and many accessory factors are controlled by specific genes, whose mutations may cause blocks at various stages and consequent inability to produce normal pigments. Albinism has been attributed to the absence of dopa-oxidase, an enzyme which converts dopa to melanin, or to a lack of the enzyme

tyrosinase, which converts phenylalanine and tyrosine to melanin. The following substances are known to be essential for melanin production: tyrosinase; copper to activate tyrosinase; and a suitable substrate, presumably tyrosine. Physico-chemical factors such as oxidation-reduction potentials control the enzymatic reaction.

Human albinism may take many forms, presenting a wide range of pigmentation of the eye, hair and skin. Clinical types include complete generalized albinism with total lack of pigment throughout the body; incomplete generalized albinism in which there is limited ability to produce melanin (cumulative with advancing age); albinoidism or leucism with very light hair and skin, no nystagmus or photophobia, good vision, and blue irides; albinism confined to the globe of the eye, in which either the entire eye is albinotic or only the fundus is involved.

All types of albinism are transmitted in hereditary patterns. Complete and incomplete generalized albinisms are most often transmitted by an autosomal recessive gene, but occasionally a dominant autosomal gene may be responsible. Albinoidism is inherited through a dominant autosomal gene. Hereditary albinism confined to the globe appears to be sex-linked recessive or intermediate sex-linked.

The albino eye is characterized clinically in varying degrees by a pink translucent iris, red pupil, nystagmus, photophobia, defective vision and considerable refractive errors. These symptoms may be ameliorated in later life concurrently with increasing pigmentation. The hair is usually white, the skin pinkish white, and the conjunctiva pinkish. The pink iris and pupil are due largely to reflected light from the choroid vasculature, but the position of the light, thickness and texture of the iris all influence the color. The fundus usually is bright orange-red, the choroidal and retinal vasculature being prominent and vividly visible. The macular area generally exhibits more uniform pinkness. The optic nerve is usually reddish. Visual acuity and ocular function are more efficient when the macular pinkness and masking of choroidal vessels are greater. The macular pigment evidently increases with age, particularly in incomplete generalized albinism and albinism of the eye alone.

In the generalized albino and the sex-linked ocular albino the visual defect is marked, while it is often less serious in the incomplete generalized albino. Many albinos are able to read fairly satisfactory type despite amblyopia for distance. Both hyperopic and myopic refractive errors, associated with marked astigmatism, are exhibited by a majority of albinos. The greatest degree of photophobia is generally manifested by the generalized albino. Central scotomata of varying degrees of density are usually shown. Horizontal nystagmus with or without a rotary component is almost always encountered in the generalized albino, becoming less severe with advancing age and increasing pigmentation. Divergent and convergent strabismus are common features of the albino. Other than lack of pigment, microscopic studies reveal no anatomic abnormalities in the albino eye. Color vision and dark adaptation are apparently normal.

Therapeutic management of the albino eye is chiefly palliative: tinted

glasses, colored contact lenses, tattooing of sclera and cornea, and so forth. Telescopic lenses are effective in correcting visual function. Hormone and enzyme therapy reduce photophobia. Most signs and symptoms of albinism improve with advancing age and accumulation of pigmentation.

Migraine: A Cause of Man-Hour Loss in Industry. M. Benzinger. *Industrial Medicine and Surgery.* Vol. 22. pp. 259–261. June 1953.

Migraine is often preceded by visual disturbance. Scotomata, in constant motion, accompanied by color flashes, usually last from five to 20 minutes and the headache ensues. Women are affected three times as frequently as men. Psychological problems are common in migrainoids.

Large blind spots varying from slightly larger than normal to a size that reduces the visual field to about half of the normal prevail. Although the blind spot may remain constantly enlarged over a prolonged period, the size fluctuates. In women the maximum enlargement occurs just prior to menstruation; women who have passed menopause may continue to have rhythmic enlargement of the blind spot. In women undergoing migraine treatment, blind spot enlargement assumes a regular cyclic pattern: maximal size is reached during menstruation and recedes following the period; in the second week the blind spot enlarges to a maximum on the 14th day after the onset of the period; minimal size is reached in the third week; and during the fourth week rapid enlargement occurs until the onset of the new period.

Apparently female migrainoids have a defect in steroid metabolism, resulting in estrogen deficiency, while males who have migraine lack androgens. Estrogens are used in treating the condition in women, testosterone in men.

Factors Influencing Results of Retinal Detachment Surgery. I. J. Koenig and C. H. Addington. *Eye, Ear, Nose and Throat Monthly.* Vol. 32. pp. 312–319. June 1953.

Modern therapy of retinal detachment, based on locating and sealing the break, has been improved only in the technique and instrumentation for sealing the break, deleting the subretinal fluid, and the introduction of scleral shortening operations to render the scleral area similar to the retinal area.

Retinal detachment generally occurs in middle-aged and older people, occasionally in younger adults as the result of trauma. In a series of 129 cases, the 29 unsuccessfully operated patients averaged 48 years of age. The prognosis, particularly regarding the visual result, is influenced by the duration of detachment. High myopia is a contributory factor in retinal detachment and offers a poorer prognosis. The vitreous may seep through a break in the retina, forcing it away from behind, or it may pull the retina forward by traction band formation due to a retinal vitreous adhesion; traction bands afford a poor prognosis. Exudate into the vitreous due to uveitis may cause formation of traction bands; retinopathy and secondary retinal degeneration resulting from uveitis may form new retinal holes or breaks during periods of stress; choroidal atrophy in uveitis may decrease the ability of the choroid to absorb subretinal fluid. However, surgery should be postponed

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until the uveitis is under control.

Retinal tears differ from holes: the former suggests an extraneous cause such as retinal vitreous adhesion; the latter implies an atrophic process in the retina. Disinsertion refers to a separation of the retina at the ora serrata and implies atrophy. Multiple and large breaks have a poorer prognosis, while disinsertion affords a better prognosis. Superior detachments do not re-attach as readily as inferior detachments.

The purpose of detachment surgery is to develop adhesions between the retina and choroid: apposition of the layers and maintenance of apposition to establish firm adhesion are required.

In patients whose detachments occur in the lower half of the globe, ambulation is permitted earlier than in others. However, most patients are kept immobilized for two to three weeks. Pinhole glasses are prescribed to discourage reading and limit activity; cycloplegia is maintained for a number of weeks.

Cataracts Caused by Carbohydrates. J. W. Patterson. *American Journal of Ophthalmology.* Vol. 36. pp. 143–147. June 1953.

When the physiologic mechanisms for utilizing or excreting sugars are overloaded, as in diabetes, high blood levels of glucose, xylose, or galactose produce qualitatively similar cataracts. Although galactose and xylose cataracts seem related to high blood sugars, other factors may play a role in producing diabetic cataract. However, the primary role of high glucose levels is evident since diabetic cataract is preventable by lowering blood sugar with phlorizin which corrects high blood sugar while other factors remain unchanged. Galactose and glucose act synergistically to produce cataracts.

A group of rats made diabetic with alloxan and then placed on a diet containing 20 per cent galactose, developed cataracts in 35 to 60 days. A second group, given alloxan and maintained on a galactose-free diet, required 61 to 77 days to develop cataracts. A third group, given a 20 per cent galactose diet but receiving no alloxan, was observed for 84 days, at which time 50 per cent had not developed cataracts. The first group developed cataracts significantly sooner than either of the other two.

Inasmuch as phosphate and ascorbic acid compete with glucose for absorption, supplements were administered to diabetic rats to determine their effect on cataract development. A group of diabetic rats given phosphate in their drinking water developed cataracts in 68 to 110 days; another diabetic group injected with dehydroascorbic acid developed cataracts in 75 to 103 days. No significant delay in cataract formation was evident when these groups were compared with animals having equally severe diabetes but receiving no supplements.

It has been postulated that these cataracts are due to the blocking by excess sugar of the absorption of some essential metabolite. To test this hypothesis, two groups of non-diabetic rats were given diets containing 35 per cent galactose four days of the week; one group was starved on the remaining three days, while the second group was given normal chow. The group that was starved developed cataracts in 37 to 45 days; the group receiving normal chow did not develop cataracts. The author interprets this to

indicate that carbohydrate cataracts result from a metabolic deficiency which could be corrected by providing the proper supplement when high blood sugar did not block cellular absorption.

This study was supported in part by a research grant from the National Society for the Prevention of Blindness.

Medical Forum—The Physician and the Cross-Eyed Child. Comments by R. Aebli, L. V. Kogut, A. N. Lemoine, Jr., A. Jampolsky, G. P. Guibor, M. I. Steckler, and E. Krimsky. *Modern Medicine.* Vol. 21. pp. 144–154. June 15, 1953.

Discussion of Dr. Richard G. Scobee's article "The Physician and the Cross-Eyed Child," which appeared in *Modern Medicine*, February 1, 1953, was invited. The above authors were asked "When should strabismus in children be corrected?"

Dr. Aebli—Since perfect horizontal or vertical alignment of the visual axis is almost impossible at the age of one year, and the eyes do not approximate their full size until the second year, strabismus should not be corrected surgically when the baby is one year old. Congenital strabismus, usually present at birth or within the first six months of life, should be corrected by surgery at about three years of age. Acquired strabismus, usually manifest before two years of age, is amenable to orthoptic therapy; in most instances corrective lenses will restore normal vision.

Dr. Kogut—The idea that squint cannot be helped until the child is old enough for subjective examination should be condemned. Earlier correction of squint affords a better chance for normal development, since the amount of vision lost is directly proportional to duration of the squint. Most patients are seen when the prognosis is less favorable, after the age of five; binocular vision has already developed at that time. Treatment must be begun before the onset of fusion to attain binocular vision.

Dr. Lemoine—Treatment of strabismus should begin as soon as the condition appears; occlusion therapy, glasses, or both may be used. Surgery should be deferred until the third to fifth year. After age five, eye exercises are most satisfactory. However, to avoid amblyopia, therapy should be started between the third and sixteenth month.

Dr. Jampolsky—As soon as strabismus occurs, treatment should be initiated. Within the first six months it must be established whether the eyes are crossed constantly or only occasionally. If strabismus is intermittent but binocular vision is used most of the time, treatment may be deferred. Constant strabismus should be treated immediately to stop bad habits of vision, anomalous sensory visual development, and anatomic muscle contraction. Intraocular pathology must be ruled out and the significance of any refractive error determined. Early treatment involves correction of refractive error and alternate occlusion of the eyes. The best time to develop good binocular vision is between ages one and six. Constant strabismus is rarely outgrown spontaneously. Surgical correction should be done at the age of one year if strabismus is marked.

Dr. Guibor—Immediate nonsurgical treatment should begin as soon as strabismus is noticed. If it is not treated gradual loss of vision ensues in the deviating eye, which fails to de-

velop. One probable cause of squint is disorder of the central nervous system, since strabismus was found in 50 per cent of cerebral palsy patients.

If proper lenses and eye drops are used, 80 per cent of children demonstrating squint at birth or within the first year, or farsighted children who develop crossed eyes at two or three years of age, recover without surgery. In such cases it is wise to defer operation. Strabismus resulting from mechanical defects such as shortening of an ocular muscle is amenable to surgery when the patient is several years old. Since normal vision does not develop until the child is two to three years of age, surgery at one year does not yield optimal visual results. The goals of strabismus therapy, normal sight in each eye, normal motor coordination, normal fusion, and elimination of strabismus, may be achieved with atropine drops, special prism glasses, occlusion of the better eye, fusion exercises, and finally surgery.

Dr. Steckler—The general physician should know that spontaneous cure is rare, that only an ophthalmologist can determine the need for surgery, that a squinting child of whatever age should be referred to an ophthalmologist, and that surgery is not hazardous to sight or life. The ophthalmologist must determine the type of squint, visual acuity, amount of amblyopia, degree of deviation at distance and near, and other factors. Strabismus should be corrected as early as possible after the age of six months.

Dr. Krimsky—Cross-eye is a psychological as well as medical problem. The eye is not straightened spontaneously by nature, but is amenable to early treatment. Often the crossed eye can be corrected by binocular re-education or training. The need for glasses and concomitant eyestrain may cause crossed eyes. If surgery is necessary it may be safely performed at any age. The merits of eyeglasses, operation, and training, alone or in combination, should be considered, and observation of the patient should be continued over a period of years.

Research in Occupational Seeing. N. F. Stump. *American Journal of Optometry and Archives of the American Academy of Optometry.* Vol. 6. p. 294. June 1953.

An attempt is made to answer the questions, "How is visual performance of industrial workers related to numerous criteria of job success?" and "Can the information . . . be used to stimulate better work efficiency in industrial and commercial organizations in general?"

Studies of visual performance were conducted in 35 industrial plants of various types in different parts of the country. Visual performance was studied in relation to production, quality, inspection, ratings, training costs, absence from work, and turnover. Tests were conducted for near and far visual acuity in each eye separately and both eyes together; lateral phoria; depth perception; and color vision. The results are based on individual records for over 3,500 employees.

In general, the high criterion groups possessed better visual performance than the low criterion groups. In studies relating frequency of serious accidents and visual performance, it was found that 88 per cent of the accident-free group, 43 per cent of those with a high frequency of minor accidents, and only 20 per cent of the

serious injury group passed the depth perception test. A similar relationship was found for lateral phoria: 63 per cent of the accident-free group, 40 per cent of the minor accident group, and 20 per cent of the serious injury group passed the test.

Structure of the Vitreous Body; Observations by Means of the Phase-Contrast Microscope. A. A. Rossi. *British Journal of Ophthalmology.* Vol. 37. pp. 343–348. June 1953.

The vitreous bodies of rabbit eyes were examined under the phase-contrast microscope. No true microscopic fibrous structure was observed in untreated samples from eyes studied 15 to 20 minutes after death or after two to eight hours of storage at two degrees Centigrade. The only structures detected were minute crystals of diverse form. Samples which were not fresh, or were treated with fixative, demonstrated a fibrous structure. An irregular fibrillar network was evident in the vitreous bodies of rabbit eyes enucleated six to eight hours after death and then refrigerated for six to eight hours. In human eyes, enucleated six to 24 hours after death, the vitreous bodies had a fibrous structure.

Apparently the vitreous is a colloid in the form of a gel. Earlier observations that the vitreous had a microscopic fibrous structure were merely an experimental artifact.

Visibility of School Tasks. J. M. Ketch and C. J. Allen. *Illuminating Engineering.* Vol. 48. pp. 299–305. June 1953.

In the present study, school tasks ranged from three-point visibility to 17-point visibility. Factors contributing to low visibility are small handwriting, smudging from erasers, small print, printing on gray paper, and printing with gray ink. Improvement in visual tasks must come from reduction of glare, reflected glare, high brightness contrast, and an increase in illumination.

Many visual tasks are inherently difficult because of detail size, lack of contrast with the background, or disturbing reflection. For improving the visibility of such tasks help must come from more suitable lighting and visual environment. Print size and leading vary with the amount of text to be printed. Type size also varies with the school grade for which the book is intended. Handwritten material varies in visibility with the individual and the hardness of the pencil or pen used. Teachers should stress the need for larger writing and more pencil pressure. Softer, blacker pencils and better reflecting paper produce better visibility. Office duplicator machines used carefully with good originals may produce material of good visibility.

The Interrelationship Between Blepharoconjunctivitis and Chronic Sinorespiratory Infections. S. J. Prigal. *New York State Journal of Medicine.* Vol. 53. pp. 1327–1332. June 1, 1953.

Twenty-three patients ranging in age from one to 63 years, with concomitant eye and respiratory infections, and two children with respiratory infection but no eye involvement whose mothers suffered from conjunctivitis or blepharitis, were observed. Nineteen of these were studied by bacteriologic culture, and in 13 cases identical organisms were encountered from both sites of infection. In two other cases although similar organisms

were cultured, the hemolytic response differed. The remaining four cases manifested no common flora. The most frequent organism encountered was the hemolytic staphylococcus (10 cases). Each site of infection (eye or respiratory tract) may act as a focus of reinfection for the other. Patients with chronic or repeated sinorespiratory infections should be examined not solely for respiratory involvement, but for infection of the eyes and lids as well. A search for a carrier within the family should be made.

Activity of the Cerebral Cortex in Amblyopia. G. Parsons-Smith. *British Journal of Ophthalmology.* Vol. 37. p. 359. June 1953.

Existing evidence suggests that loss of vision in amblyopia ex anopsia in children is effected by the brain, since even in extreme cases associated with strabismus no abnormality is demonstrable in the eye. Loss of sight in one eye results from the arrival at the cerebral cortex of two images instead of one, and the subsequent production of an inhibitory process suppressing vision in the squinting eye. If treated the process is reversible; if untreated visual loss is permanent. Supportive evidence for the cerebral origin of squint was found in the electroencephalogram (EEG), in which an appreciable proportion of children suffering from strabismus showed abnormalities in the occipital region of the cerebral cortex, while normal children rarely displayed occipital abnormalities.

To determine whether any relationship exists between the variety of cortical rhythms and the degree and etiology of amblyopia, resting EEGs in 50 amblyopic children of ages five to twelve were assessed and compared with the general clinical state and ophthalmic condition. Only 12 of the 50 patients had normal EEG tracings, seven showed records of doubtful normality, and 31 had grossly abnormal patterns. Epileptic dysrhythmia appeared in eight patients, only one of whom had a family history of the condition. Of 21 cases with family histories of strabismus only five had normal EEG records.

Amblyopia was congenital in 13 of the 50 cases, and in 37 it was acquired. The neurological and EEG findings are similar in congenital and acquired amblyopia. All congenital cases failed to respond to occlusion therapy, while only 54 per cent of the acquired cases failed to respond.

Estimated Prevalence of Blindness in the United States, July 1952. R. G. Hurlin. *Social Security Bulletin.* Vol. 16. p. 8. July 1953.

Estimates of the prevalence of blindness are useful in evaluating measures taken for the prevention of blindness and in administering and planning programs for aid to the blind. Partly because blindness may denote loss of sight varying in severity from a visual defect preventing activities requiring vision to total inability to distinguish light from darkness, reliable statistics on the prevalence of blindness have been lacking. Lack also of periodic statistics prevents safe conclusions concerning changes in the rate of blindness and the effects of advances in medical treatment.

"Economic blindness" has been defined by the American Medical Association as visual acuity of less than one-tenth, or less than 6/60 or 20/200, in the better eye with corrective lenses, or an equally disabling loss of

visual field. However, not all states adhere to these standards; and, since not all persons whose vision is at the upper limit of the definition regard themselves as blind, many do not come to the attention of the enumerator or case finder. Previous to this report the best estimates of the prevalence of blindness in the United States were those of the author, which appeared in the *Social Security Bulletin*, March 1945 and September 1950.

The rate of blindness, determined chiefly by composition of population with respect to age and race, and by public health standards, varies from state to state. The proportion of older persons is one of the principal factors governing the prevalence of blindness. Cataract and glaucoma, the two most frequent causes, occur chiefly in later life. In areas with a large nonwhite population higher prevalence rates have been shown for nonwhite than for white persons. This probably reflects less education and lower economic standards of the Negro and Indian segments, rather than inherent racial characteristics. Public health standards in the various states are indicated by their respective infant death rates. Values representing each factor, converted to percentages for the United States, were combined and weights assigned to give each factor its assumed appropriate influence in determining differences in the rates of blindness: age percentages were multiplied by four; race percentages by two; those for the general health factor by ten.

Based on these assumptions, Utah has the lowest rate, 1.40 blind persons per 1,000 population; its proportion of older persons is low, its nonwhite population very small, and its infant death rate low. Oregon and Connecticut, with the next lowest rates, have a higher proportion of older persons, but have small nonwhite populations and the lowest infant death rates in the nation. New Mexico, at the other extreme, has a calculated rate of 3.42 blind persons per 1,000 population; it has an exceptionally high infant death rate, but has the lowest proportion of older persons and a relatively small nonwhite population. A marked geographic relationship is revealed by the estimated rates of blindness. The Gulf and Atlantic states, from Louisiana to Virginia and the District of Columbia, and Arizona and New Mexico, have rates higher than 2.4 per 1,000. Texas, Oklahoma, Missouri, Maine, and the states just north of the first group have estimated prevalence rates between 2.0 and 2.3 per 1,000. Rates for all other states are less than 2.0 per 1,000 population.

The prevalence rates were calculated by relating the aggregate numbers, weighted proportionately with the influences of factors of age, race and health, to the rate of blindness for the state of North Carolina. This rate, 2.47 blind persons per 1,000 population, was computed from an actual count of 10,318 blind persons made by the North Carolina State Commission for the Blind as of the end of June 1952. The data in the report made at that time included the sex, age and race of the blind persons, and it is from these figures, using the population figures of the Bureau of the Census for July 1, 1952, that the prevalence rates are computed. The Commission for the Blind was established in 1935 by legislation which contained a provision making mandatory the maintenance of a complete registry of blind

persons. The Commission staff believes that the registry now represents a reasonably accurate enumeration of North Carolina's blind population.

The current method of estimating rates of blindness, designed to approximate differences for states or sections of the country at a given time, does not serve as well for estimating changes with time. This is largely attributable to the importance of the health factor and the inability to measure it at successive periods. The 1940 estimate placed the nation's prevalence rate at 1.75 per 1,000 population, representing about 230,000 blind persons. Applying the same rate, 1948 estimates gave a total of 255,000 blind persons. The total estimated for July 1, 1952, was 308,419 blind persons in the United States, a rate of 1.98 per 1,000 population. Since the proportion of the population aged 65 or more increased by 20 per cent between 1940 and 1950, and is continuing to increase, Hurlin believes that the number of blind persons and the prevalence rate of blindness are also increasing.

Relation of Critical Fusion Frequency to Fatigue in Reading. T. A. Ryan, M. E. Bitterman, and C. L. Cottrell. *Illuminating Engineering.* Vol. XLVIII. p. 385. July 1953.

Critical fusion frequency (CFF), the rate of flashing at which perception of a flashing light changes from "flickering light" to "continuous light," varies from person to person, under different physical conditions, and in the same person from time to time even under constant external conditions. It has been found by other investigators that the CFF is depressed by prolonged difficult mental or visual work, suggesting that the measurement of CFF before and after a given task would indicate the degree of fatigue produced by the task. The effects of brain injury, various diseases, and drugs suggest that the CFF is related in some way to the state of the whole nervous system, rather than being limited to the ocular mechanism.

If the CFF as an index of fatigue is to be useful in solving problems in optimum illumination levels of offices and classrooms it must be sensitive enough to indicate the effects of ordinary reading. Thus, the authors tested the relation between prolonged reading and CFF. Their results did not indicate that CFF can measure fatigue after three and one half hours of reading under varying conditions of illumination and glare. Two possible explanations for the discrepancies between the present results and those of previous experimenters follow: (1) CFF decrement may be sensitive only to severe fatigue and the task was neither long enough nor difficult enough to produce this effect; (2) CFF decreases as a result of general strain or stress rather than as a result of visual strain alone.

It is concluded that at present there is no measure sufficiently sensitive to detect the effects of visual strain in an ordinary reading task. CFF reflects the general difficulty, stress, alertness, and concentration required by the task.

Venous Pressure and Ocular Tension. Data Concerning the Diurnal Variation of Ocular Tension. P. Weinstein and J. Forgàcs. *British Journal of Ophthalmology.* Vol. 37. p. 444. July 1953.

The idea that the etiology of diurnal changes of ocular tension is linked

with changes in arterial blood pressure has been disproved. The authors have investigated the possibility of correlating general venous pressure and diurnal variation of ocular tension.

The pressure of the cubital vein (forearm) demonstrates a characteristic diurnal variation, being lower in the morning; which is generally concomitant with the filling of the episcleral aqueous veins. In glaucoma the cubital venous pressure is higher in the morning.

The change during the day in reactive hyperemia of the dermal capillaries of the fingers suggests a corresponding change in the intraocular capillaries. The central nervous system controls these diurnal changes of rhythm.

On the Problem of an International Nomenclature for Designating Visual Acuity. K. N. Ogle. *American Journal of Ophthalmology.* Vol. 36. p. 909. July 1953.

A special subcommittee was appointed in 1951 by the American Committee on Optics and Visual Physiology to explore the possibilities of standardizing for international use geometric and decimal systems for designating visual acuity. Recommendations were submitted to the Committee on Optotypes of the International Council of Ophthalmology. A majority point of view was obtained regarding standardization of a mode of designating visual acuity and a gradation of steps in letter size for visual acuity charts. The conclusions of the majority of members of the subcommittee follow:

Although visual acuity charts are used primarily to determine refractive errors, their design should make possible visual acuity determinations with reasonable accuracy.

Snellen notations such as 20/30, 5/6, or 14/16 are admissable only when tests are conducted at 20 feet, five meters, or 14 inches, respectively, the numerator indicating the distance at which measurements are made.

A geometric progression in the sizes of letters on successive lines of the visual acuity chart is desirable, although there is no proof that it would represent a physiological attribute of different visual acuities.

The geometric progression in which the letter size of a given line is 1.26 times that of the preceding line of smaller letters appears satisfactory.

It is impossible to work out a uniform decimal system for designating visual acuity and preserve a geometric progression of letter size, unless the decimals used have an arbitrary basis. In the latter case the decimals would be useless for conversion or interpolation to other visual acuity scales unless tables are employed.

An important objection to a decimal system is that it tends to connote a percentage of normal vision, and one tends to compute mentally a percentage "loss" of vision. The implication is untrue and misleading.

The basic assumption is made in the decimal system and in Snellen notation that 1.00 represents "normal" vision. Actually the "normal" visual acuity of normal eyes is better than 1.00.

Visual acuity should be stated in terms of the quantity actually measured, namely, the visual angle of resolution. Such a designation would be automatically international and readily understood by all, including the layman.

The particular choice of letters in the lines of the visual acuity chart poses a much more serious problem.

On the basis of the above conclusions the subcommittee made these recommendations:

1. A decimal system for designating visual acuity should *not* be standardized for international use.

2. Serious attention should be given at once to adoption of the visual angle of resolution, expressed in minutes of the arc of the component parts of test letters of the chart, as designating visual acuity.

3. A geometric progression in letter size for progressive lines of the visual acuity chart is desirable. However, no particular geometric progression should be standardized; this should be chosen according to the needs for a given chart.

4. If (2), above, is not immediately acceptable, no standard international designation system, decimal or otherwise, should be adopted.

A Report on the Visual Screening Program in the Public Elementary Schools of Oak Park (Illinois) for 1950–1951. P. Good and H. Holmes. *Illinois Medical Journal.* Vol. 104. August 1953.

After more than 15 years of vision screening of elementary school children with the standard Snellen "E" chart, the Massachusetts vision test was used in 1945 and 1946 to determine the desirability of a more sensitive test method. During those two years there were too many needless referrals, and the muscle testing for small children was uncertain and time consuming.

On returning to the Snellen chart and rechecking all children who failed the first screening test, the number of over-referrals was reduced to a minimum. Hyperopia referrals were made when children from grades three to eight tested with plus 2.00 glasses and younger children tested with plus 2.50 glasses failed on the 20/30 line. The test was given binocularly. The value of a manifest hyperopia test in the grade school is questionable and will probably be eliminated from Oak Park's lower grades. A simple test for suppression and muscle imbalance based on prism dislocation was found to check with the cover test, giving 2.37 per cent referrals.

Irritants in Smog

A recent report by Dr. H. E. Stokinger in the *American Journal of Public Health* reveals that eye irritation in Los Angeles smog is produced by organic peroxides or similar irritants which are formed by the interaction of ozone or nitrogen oxides and certain organic compounds found in smog. Such lachrymators and eye irritants act on a chemical group, the sulfhydryl group, common to a number of enzymes. The irritating substances cause inhibition of the activity of enzymes found at nerve endings. On exposure to the polluted vapor lachrymation begins immediately; it ceases after prolonged exposure, and signs of conjunctivitis begin to appear.

It has been found that the above substances resemble those responsible for injuries from ionizing radiation. A means of protection against the latter has been discovered: reducing agents (hydrogen donors), for example alcohols, which probably act by stimulating an enzyme called catalase.

BOOKS AND PAMPHLETS

Education of the Slow-Learning Child. C. Ingram. The Ronald Press Company, New York. 1953. 359 p. $5.00.

This book is designed for school administrators, school psychologists, curriculum consultants, and special class teachers, and is aimed at planning a program for slow-learning children from five to 17 years of age. It is concerned with the place of such children in society, the type of education they need to achieve the greatest measure of life adjustment, and guidance and teaching methods best suited to their requirements.

The subject matter relates primarily to problems of mentally retarded children both in the regular classroom and in the special class. In a section devoted to the physical well-being of the child, adequate classroom lighting, visual screening, and the special problems of progressive eye impairments and other permanent disabilities are mentioned.

Diseases of the Retina. Second Edition. Herman Elwyn, M.D. Blakiston Co., New York. 1953. 713 p. $12.00.

Diseases of the retina are discussed within the general classifications of disturbances in circulation, vascular malformations, hereditary degenerative diseases, inflammatory diseases, tumors, developmental anomalies, and radiation injuries. The understanding of many of these diseases has increased since the publication of the first edition, so that the need for revision of some chapters and the addition of others has been indicated. Those dealing with essential hypertension and diabetic retinopathy have been revised. A new chapter is included in which retrolental fibroplasia is discussed. Introductory material has been added to the section on hereditary diseases, including an attempt to classify these conditions. Recent pathological reports of some hereditary diseases have been added. The work of Woods and his associates in ocular tuberculosis is discussed in a separate chapter, and a short discussion on sarcoidosis has been added.

The book contains 243 illustrations, 20 in color, and a subject index. A bibliography is provided at the end of each chapter.

Handbook on Federal Grants-in-Aid. American Parents Committee, Inc. New York. 1953. 216 p. $1.50.

The object of this handbook is to explain the principal federal grants-in-aid and to stimulate state and local agencies as well as public-spirited individuals to gain knowledge of the relationships between federal aid and state and local governmental services. A short history of federal grants-in-aid is included and the assets and liabilities of this method of subsidy are outlined. The principal programs aided by federal funds and the amounts going to each state are described. A guide is provided for making state and local studies of health, education and

social welfare services supported in part by federal funds.

Of particular interest to prevention of blindness workers are the sections on crippled children's services, aid to the blind, and aid to the permanently and totally disabled.

Special Education of the Exceptional Child. Edited by Rev. William F. Jenks, C.SS.R. Catholic University of America Press, Washington 17, D. C. 1953. 156 p. $2.75.

This book represents the proceedings of a workshop on special education conducted at Catholic University June 13 to 24, 1952. The great need for special facilities and trained teachers for handicapped children in Catholic schools was stressed.

Retinal Circulation in Man and Animals. I.C. Michaelson.Charles C Thomas, Springfield, Illinois. 1953. 146 p. $6.75.

The developmental and adult conditions of the vasculature of the inner eye of vertebrates are reviewed by the author who is adviser in ophthalmology to the government of Israel and chief of the department of ophthalmology of the Government Hospital at Haifa. Certain representative species of each class of vertebrates are given detailed description. The role of the intraocular blood vessels is considered in relation to the nutrition of the retina. In this connection two aspects are emphasized: the role of the choroid in retinal nutrition and factors in the developing retina capable of affecting the growth of new vessels.

In view of the current interest in retrolental fibroplasia this monograph is most timely since it gives insight into the mode of development of intraocular vessels. The thought is projected that the pathology of many retinal diseases, resulting from disturbance of the inner ocular vessels, can be better understood through knowledge of the anatomy and development of these vessels.

How to Drive Better and Avoid Accidents. Paul W. Kearney. Thomas Y. Crowell Co., New York. 1953. 242 p. $2.95.

In this book designed for the average motorist sheer luck is stressed as a probable factor in many accident-free driving records. The numerous hazards faced in the everyday operation of a car are described, and safe practices are explained in nontechnical language.

In a chapter headed "How Fast Can You See?" Mr. Kearney deals with vision, "the most critical factor in good driving." He discusses the dangers of low visual acuity, "tunnel" vision, glare blindness; he points out ways of recognizing these defects and what to do about them when they occur. The driver who sees well but doesn't look is discussed elsewhere.

Effect of Tinted Windshields and Vehicle Headlighting on Night Visibility. Bulletin 68. Highway Research Board. 2101 Constitution Avenue. Washington 25, D. C. 1953. 61 p. 90 cents.

Five papers presented at the 32nd annual meeting of the Highway Research Board, January 13–16, 1953, are included in this pamphlet.

The discussion of "Effect of Tinted Windshields on Nighttime Visibility Distances" by W. Heath and D. M. Finch, indicates great variations of the effects of tinted glass as compared to

clear glass, but most of the data show considerable reduction of visibility when green glass is used.

V. J. Roper reports on "Nighttime Seeing through Heat-Absorbing Windshields" and indicates that although nighttime seeing distances are slightly reduced with heat-absorbing windshields, the benefits from this glass during daytime driving offset the small reduction in seeing distance at night.

The development of the Guide "Autronic Eye" described by G. W. Onksen offers real possibilities in solving the glare problem by automatically switching between upper and lower beams of headlamps in response to critical levels of illumination on the road. Other papers dealing with headlamp design, and glare from passing beams of headlights were presented by A. J. Harris and G. Grimes, respectively.

Gifford's Textbook of Ophthalmology. Fifth Edition. Francis Heed Adler, M.D. W. B. Saunders Company, Philadelphia. 1953. 488 p. $7.50.

This already deservedly popular text has been considerably improved on the basis of Dr. Adler's years of teaching undergraduate medical students. Since the hypertensive diseases and diabetes are of much interest to the family physicians, these sections have been greatly expanded. Discussion of major surgical techniques is omitted. There is an excellent chapter for the general physician on glaucoma, with lucid descriptions of the clinical picture in secondary, primary and congenital glaucoma. Throughout the text revisions have been made to keep the treatment up to date with therapeutic advances.

May's Manual of Diseases of the Eye. 21st Edition. Edited by Charles A. Perera, M.D. Williams and Wilkins Company, Baltimore. 1953. 512 p. $6.00.

For 53 years this has been a standard text in ophthalmology for students of medicine. Dr. Perera has kept May's excellent text entirely current with new scientific knowledge and with therapeutic advances. The 21st edition has been greatly enhanced in value by the inclusion of 25 new colored illustrations by E. G. Bethke.

Many practitioners will find the manual of added practical value because at appropriate points there are provided the full 1941 report by the Committee on Visual Economics of the American Medical Association on factors to be considered in compensation for eye injuries, the A.M.A. Section on Ophthalmology visual standard for operating motor vehicles, and the ocular requirements for admission to the Army, Navy, Marine Corps, Coast Guard and Aviation Services.

Ocular Therapeutics. 2nd Edition. William J. Harrison, M.D. Charles C Thomas, Springfield, Illinois. 1953. 284 p. $6.50.

This pocket manual was written to provide the ophthalmologist with an easy, accessible reference for prescriptions used in treating various eye conditions. The author expresses the hope that it will also serve as an indication of what constitutes modern practice in writing ocular prescriptions.

In the new edition of this text, only drugs whose therapeutic value has been determined by clinical use are given. The official drugs in the *U. S. Pharmacopoeia XIV*, the *National Formulary IX* and the 1950 edition of

New and Unofficial Remedies are included. The chapters on isotonic solutions, buffered solutions, sulfonamides, new antibiotics, and vitamins have been revised and enlarged. New chapters have been added on anticoagulants, and cortisone and ACTH.

The author is associate professor of ophthalmology at Jefferson Medical College, Philadelphia.

Ophthalmic Diagnosis. F. Herbert Haessler, M.D. Williams and Wilkins, Baltimore, Maryland. 1953. 387 p. $8.00.

In this book Dr. Haessler presents an excellent discussion of differential diagnosis based on many years of teaching experience. In the first five chapters he outlines diagnostic procedures necessary in making a general survey of the patient in relation to various eye conditions. Some of this material is repeated and extended in much greater detail in the essays which make up the last four chapters.

The many black and white diagrams which illustrate the book are most helpful in understanding the diagnostic problems involved. Both the beginning ophthalmologist and the ophthalmologist who has some responsibility for teaching will find this book a valuable addition to their libraries.

Eye, Ear, Nose and Throat Manual for Nurses. Roy H. Parkinson, M.D. 7th Edition. C. V. Mosby Company, St. Louis. 1953. 263 p. $3.75.

The seventh edition of this text retains the organization and arrangement of previous editions. An evaluation of the efficacy of newly discovered antibiotics and hormones has been added. The author, head oculist and aurist of St. Joseph's Hospital, San Francisco, feels that the nurse should be instructed in fundamentals only; discussions of details of diagnosis and treatment, therefore, are kept at a minimum.

The sections on eye disease include the anatomy and physiology of the eye; external ocular disease; diseases of refracting media of the eye; and internal diseases of the eyeball. Other chapters involving the eyes are devoted to points in care of eye, ear, nose and throat conditions; technique of preparation and conduct of eye operations; and descriptions of individual eye operations and illustrations of eye instruments. Problems of the eye, ear, nose and throat met by the public health nurse are discussed. Eighty-two illustrations are provided and quizzes are given at the end of each chapter.

1953 Supplement to Blakiston's New Gould Medical Dictionary. Blakiston Company, New York. 1953. 13 p. Free to owners of the dictionary on request to the publisher.

A 1953 supplement of 436 definitions of new medical terms and medical words currently in the news has been added to the first edition of *Blakiston's New Gould Medical Dictionary*, originally published in 1949.

"Had I invented a new dynamite, and reaped a fortune from it, I should be inclined to establish a Nobel Prize for the integrator and interpreter of science, who can in these days often serve his fellows far more than the individual who merely adds one morsel to the growing and often indigestible pile of accumulated factual knowledge."

VANNEVAR BUSH

President, Carnegie Institution, —before the District of Columbia Medical Society